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COTTAGERS' SELF HELP PROGRAM

ENRICHMENT STATUS OF LAKES IN THE SOUTHEASTERN REGION OF ONTARIO

1986

Ontario Ministry of the Environment

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Southeastern Region

COTTAGERS' SELF HELP PROGRAM

ENRICHMENT STATUS OF LAKES IN THE SOUTHEASTERN REGION OF ONTARIO 1986

Water Resources Assesment Unit
Technical Support Section
Southeastern Region

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ACKNOWLEDGEMENTS

The Ministry of the Environment acknowledges the dedication of 96 volunteers who generously gave up part of the time they spent at their lake each week to collect a sample of water and arrange for its safe delivery to Kingston. It is truly their efforts during 1986 and in past years that have ensured the continuing success of the Self Help program.

We are especially grateful for the individuals and organizations that have provided a sampling record of 10 or more years.

The following achieved a 10 or more year record of sampling with respect to their participation in the program during 1986:

Mr. D. Climenhage	Bass Lake Cottage Assoc.
Mr. D. L. Rigsby	Pinnacle Point Cottage Assoc.
Mr. R. J. Oliver	Christie Lake Assoc.
Mr. R. H. Horwood	Desert Lake Property Owners Assoc.
Mr. W. H. Johnson	Mississippi Lakes Assoc.
Mr. B. Briscoe	Jeffreys (Olmstead) Lake
Ms J. Archibald	Silver Lake Protective Assoc.
Mr. J. Arnold	Troy Lake
Mr. J. O'Dette	Mosque Lake

The above mentioned together with nine others identified in our last report who achieved a ten year record of sampling with respect to their participation during 1985 were presented with plaques at an awards banquet held in Kingston on September 19, 1986. The plaques bear the inscription:

"In appreciation of ten or more year efforts in Environment Ontario's Self Help Water Quality Testing Program to preserve and protect Ontario's valuable recreational lakes for future generations of Canadians and Visitors to our land".

The recent awards ceremony brings to a total 29 such organizations and individual cottagers so recognized.

ABSTRACT

Since 1971, the Province has had the assistance of lake organizations, cottagers and other waterfront property owners with testing the water quality of our recreational lakes. The testing involves taking water clarity measurements and collecting water samples every week or two during the summer to determine the amount of algae present. Too much algae in the water of the lake can interfere with its recreational use and enjoyment.

This report presents the results of testing for 91 lakes in the Southeastern Region of Ontario during 1986. The results are summarized and discussed in terms of seasonal and yearly variations in water quality of the lakes. The Southeastern Region includes Hastings and Prince Edward Counties and extends eastward to the Quebec border.

In general, the lakes had very good water quality which was well suited for a variety of recreational purposes including swimming and bathing. With the possible exception of Hay Bay, no lake had algae levels high enough to be considered a nuisance.

The results show that algae growth varies in intensity in some lakes at different times of the year. In lakes, where a seasonal influence was apparent, the most common pattern was one of increasing algal levels and declining water clarity as the summer progressed.

Algal levels were higher and water clarity poorer in most lakes than they were during 1985. This is believed to be due to the unusually wet weather experienced during the summer of 1986. Increased amounts of rainfall resulted in more phosphorus and nitrogen being washed into the lakes in stream flow and runoff than in a more typical season. Phosphorus and nitrogen promote the growth of algae in a lake.

Since seasonal and yearly fluctuations occur in water quality, trends can only be established through constant monitoring over a long number of years. With this information the Ministry of the Environment will be better able to recommend appropriate management strategies such as restrictions on shoreline development and other land use controls to protect lakes.

The report contains a Section entitled "Protection of the Lake" which offers advice to cottagers on what they can do to help maintain and improve water quality at their lake.

RÉSUMÉ

Depuis 1971, la province bénéficie de l'aide de groupements pour la protection des lacs et de propriétaires de chalets ou d'autres propriétés riveraines pour évaluer la qualité de l'eau des lacs utilisés à des fins récréatives. Une fois par semaine ou par quinzaine durant l'été, ils déterminent la transparence de l'eau et prélèvent des échantillons d'eau pour mesurer la quantité d'algues qu'elle contient. Un lac qui contient trop d'algues est moins attrayant du point de vue récréatif et touristique.

Ce rapport présente les résultats d'analyses effectuées en 1986 sur 91 lacs dans la région du Sud-Est de l'Ontario. Ils sont présentés de façon succincte avec un commentaire sur les variations saisonnières et annuelles de la qualité de l'eau des lacs. La région du Sud-Est comprend les comtés de Hastings et de Prince Edward et s'étend à l'Est jusqu'à la frontière québécoise.

Dans l'ensemble, la qualité de l'eau des lacs était très bonne et celle-ci se prêtait bien à différentes activités récréatives, dont la baignade. À l'exception peut-être de Hay Bay, aucun lac ne présentait de concentrations d'algues qu'on puisse qualifier de gênantes.

Les résultats indiquent que, dans certains lacs, les algues se multiplient plus vite à diverses périodes de l'année. Dans les lacs qui présentent pareilles variations saisonnières, le phénomène usuel est une augmentation des algues et une diminution de la transparence de l'eau au fil de l'été.

Dans la plupart des lacs, les concentrations d'algues étaient plus fortes et l'eau plus trouble qu'en 1985. Les précipitations anormalement élevées de l'été 1986 semblent en être la cause, de même que le fait que les affluents et les eaux de ruissellement ont déversé plus de phosphore et d'azote dans les lacs que d'habitude. Le phosphore et l'azote favorisent la croissance des algues dans les lacs.

Compte tenu des variations saisonnières et annuelles dans la qualité de l'eau, toute généralisation nécessite une surveillance continue sur de nombreuses années. Les renseignements ainsi recueillis permettront au ministère de l'Environnement de faire de meilleures recommandations sur des stratégies de gestion telles que la limitation de l'aménagement des zones riveraines et autres restrictions de l'utilisation du sol pour protéger les lacs.

Ce rapport comporte un chapitre portant sur la protection des lacs et expliquant aux propriétaires de chalets ce qu'ils peuvent faire pour aider à sauvegarder et à améliorer la qualité de l'eau de leurs lacs.

1.0 INTRODUCTION

Ontario has countless thousands of inland lakes and borders on 4 of the 5 Great Lakes. Increasing amounts of leisure time, growing affluence and the easy accessibility of lakes from urban centres of population have resulted in the extensive development of shorelines with summer cottages, waterfront resorts and campgrounds.

Increasing development and other activity around a lake can often lead to changes to the lake itself. The clearing of land for building and seepage from sewage disposal systems increases the rate of supply of plant nutrients, particularly phosphorus, from the land to the lake. Phosphorus more than any other nutrient promotes the growth of aquatic plants and algae. Algae are microscopic green plants. Along with other green plants they convert inorganic nutrients and the radiant energy of sunlight to the chemical energy of plant tissue through the process of photosynthesis. Plant growth is referred to as primary production. An increase in primary productivity gives rise to an increase in productivity at all levels in the food chain, up to and including fish. The process of increasing nutrient enrichment and biological productivity in a body of water is known scientifically as eutrophication.

A certain amount of euptrophication is beneficial. All lakes require nutrients for the production of aquatic life. Aquatic plants and algae provide shelter, food and oxygen for fish. Too much growth, however, can interfere with water oriented recreational activities. Increased amounts of algae cause a lake to become progressively more turbid and water clarity declines as a result. Under conditions of extreme eutrophication pea-soup scums called "algal blooms" and thick shoreline weed growth can occur. A lake that is plagued with algal blooms and choked with weeds is of little or no recreational value.

Algal blooms and weeds affect more than just the surface of the lake. As they die they sink, decompose and use up the limited oxygen supply at the bottom of a lake. If deep water fish such as lake trout or other creatures that inhabit these depths are present, they may be robbed of the oxygen they need to survive. In this manner, highly sought after sports species such as lake trout tend to be replaced by less desirable fish.

In 1970, in response to concerns that the water quality of our lakes was being threatened by shoreline development, the Province initiated a comprehensive lake water quality survey program. Lake surveys are carried out to evaluate the physical, chemical and biological properties of lakes with a special emphasis on defining their nutrient enrichment

status. Since then over 300 lakes have been surveyed in the Southeastern Region of Ontario alone.

It was recognized that while the recreational lake surveys provide a base line evaluation of water quality, continual monitoring of these lakes over an extended period of time would be necessary to understand year to year changes and assess long term trends.

Following the launching of the lake survey program, the Province began to enlist the voluntary assistance of cottage associations and other lakeside residents to make water clarity observations on their lakes and to collect samples of water for analysis of their algae content. In 1971 this Self Help Program involved 12 lakes across Ontario. In 1986 it included 91 lakes in the Southeastern Region alone. A total of 1093 observations were made on these 91 lakes averaging over 12 observations per lake. Over a period of time the information acquired through the Self Help Program will eventually help us to determine whether the water quality of a lake is improving, deteriorating or staying about the same.

The Southeastern Region includes Hastings, Prince Edward and Renfrew Counties and extends eastward to the Ontario-Quebec border. The region encompasses an area of 35,523 square kilometres and has a population of 1.2 million people.

2.0 METHODS

Volunteers in the Self Help program are supplied with a sampling kit which includes a Secchi disc, a water sampler, sample bottles and detailed sampling instructions. A Secchi disc is a circular steel plate 20 cm. in diameter painted in opposing black and white quadrants (figure 1). It is used to measure the water clarity of a lake by lowering it into the water and noting the depth at which it disappears from view.

Each volunteer is asked to select a single sampling location, at a central or open water area of their lake, well removed from any localized shoreline influences. The volunteers take a Secchi disc visibility depth measurement and collect a sample of water at this location on a regular weekly or biweekly basis throughout the ice free seasons of the year, depending upon their availability at the lake.

The water samples are submitted to the Ministry of the Environment for analysis of their chlorophyll content. Chlorophyll is a photosynthetic pigment found in all green plants. The concentration of chlorophyll in a water sample is an indication of the amount of algae present in the lake at the time of sampling.

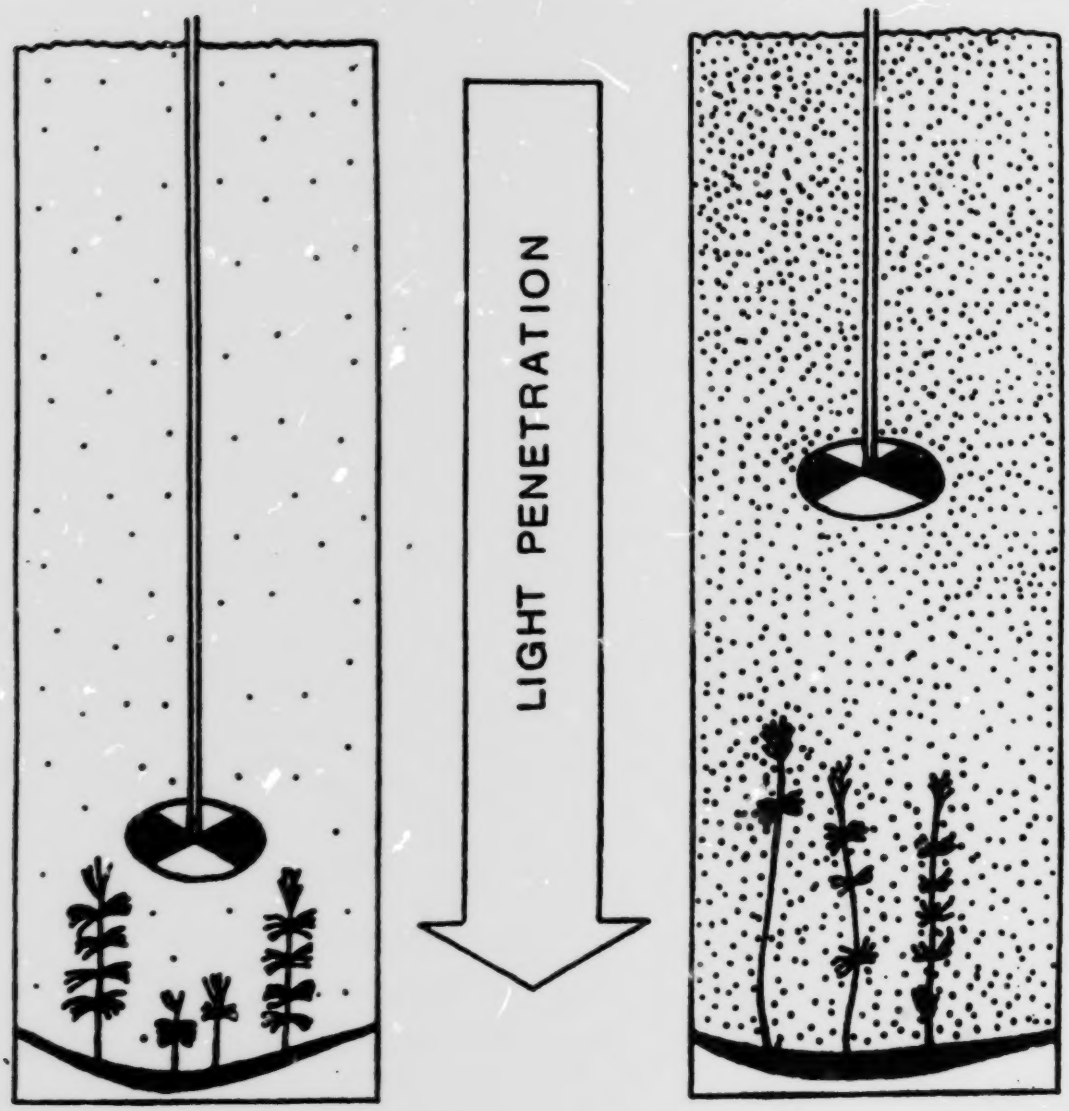


Figure 1: Diagram illustrating the use of a Secchi disc to measure water quality. Good visibility characterizes clear lakes with low algal densities (left panel). Poor visibility characterizes productive lakes with high algal densities (right panel).

Water samples are filtered using a 1.2 u nylon filter, the residue extracted with 90% acetone and chlorophyll concentrations determined photospectometrically according to standard methods of the Ministry of the Environment, Laboratory Services Branch. Prior to 1985 chlorophyll samples were processed using a 1.2 u cellulose nitrate filter. The change to a nylon filter was made in 1985 since it was discovered that the nylon filter results in better recovery of chlorophyll from lake water samples. Therefore the current laboratory procedure provides a more realistic indication of the level of algae present in a lake.

3.0 RESULTS AND DISCUSSION

Mean Secchi disc visibility depth and chlorophyll concentration results for 1986 are summarized in table 1, while individual measurements and a summary of previous years' data for each lake are provided in the appendix.

3.1 Classification of Lakes

Lakes are classified on a continuously rising trophic (nutrient enrichment) scale according to their biological productivity. At the nutrient poor end of the scale are oligotrophic (unenriched) lakes. Oligotrophic lakes are characterized by low levels of chlorophyll and exceptionally clear water. They are usually deep lakes (more than 30 m). The shoreline is sparsely populated with aquatic plants.

Table 1: Mean Secchi disc visibility depths (m) and mean chlorophyll concentrations (ug/L) 1986

LAKE	ID NUMBER	CHLORO	SECCHI	
BAGOT LONG	18-3490-041-01	11.6	2.7	1
BASS	12-0017-001-01	1.8	5.1	1
BEAVER - NORTH BASIN	17-0030-001-01	5.1	2.4	
BEAVER - SOUTH BASIN	17-0031-002-01	6.1	2.2	
BIG GULL (CLARENDON)	18-3430-003-01	2.6	4.1	
BIG RIDEAU	18-0033-006-01	3.7	4.4	
BLACK (NORTH BURGESS TWP.)	18-0033-026-01	3.9	3.9	
BLACK BAY (PETAWAWA RIVER)	18-4930-001-01	2.6	3.3	
BLACK DONALD	18-3490-043-01	2.2	4.9	
BOBS (CROW BAY)	18-0033-012-01	4.3	4.3	1
BOBS (EASTERN BASIN)	18-0033-010-01	5.0	4.2	
BOBS (GREEN BAY)	18-0033-011-01	1.9	4.6	
BOBS (LONG BAY)	18-0033-010-01	3.8	3.5	1
BOBS (MUD BAY)	18-0033-008-01	9.2	2.3	
BOIS DUR, LAC DE (PETAWAWA R)	18-4930-002-01	1.6	3.8	1
BOULTER	18-3490-009-01	2.8	2.6	
BRULE (WENSLEY)	18-3490-010-01	1.6	7.7	
BUCK - NORTH BAY - NORTH END	12-0004-003-01	5.1	3.9	
BUCK - NORTH BAY - SOUTH END	12-0004-002-01	4.9	3.5	
BUCK - SOUTH BAY	12-0004-004-01	3.1	5.0	
BURRIDGE	18-0033-014-01	2.6	4.6	
CHARLESTON - GOOSE ISLAND	12-0017-006-01	3.9	3.5	
CHARLESTON - WEBSTERS BAY	12-0017-004-01	3.6	3.4	
CHARLESTON - WESTERN WATER	12-0017-005-01	4.0	3.5	
CHIPPEGO	17-0035-002-01	5.9	3.2	
CHRISTIE	18-0033-015-01	4.2	4.6	
CROSBY (BIG CROSBY)	18-0033-016-01	6.3	3.5	
CROW	18-0033-017-01	2.6	4.7	
CROWE	17-0021-003-01	3.5	2.4	
DALHOUSIE	18-3430-009-01	3.2	2.8	
DAVERN	18-0033-033-01	2.0	5.4	
DEMPSEYS (VIRGIN)	18-3490-014-01	2.5	5.0	
DESERT	12-0004-009-01	2.9	4.5	
DEVIL	12-0004-010-01	2.3	5.2	
DIAMOND	18-3490-015-01	2.4	5.1	
DICKEY - NORTH BASIN	17-0021-004-01	2.2	3.6	
DICKEY - SOUTH BASIN	17-0021-005-01	2.1	4.2	
EAGLE	18-0033-019-01	2.9	5.4	
ELBOW	18-0033-035-01	8.0	2.4	
FARREN (FARRELL)	18-0033-020-01	2.7	4.1	1
GANANOQUE	12-0017-008-01	5.7	2.8	
GREEN (RADCLIFFE TWP.)	18-3490-048-01	2.2	5.6	
GRIPPEN	12-0017-010-01	5.4	2.9	
HAY BAY	17-0037-001-01	25.0	1.3	

LAKE	ID NUMBER	CHLORO	SECCHI	
INDIAN	12-0004-013-01	3.7	3.9	
JEFFREY	18-3490-047-01	2.0	6.2	
JEFFREYS (OLMSTEAD)	18-4810-001-01	1.9	5.3	
JOEPERRY	17-0026-001-01	2.8	2.7	
KASHWAKAMAK	18-3430-010-01	2.0	5.2	
KILLENBECK	12-0017-011-01	13.9	2.0	
LIMERICK	17-0021-010-01	1.9	4.5	
LITTLE SILVER	18-0033-021-01	3.6	3.6	
LOUGHBOROUGH - EAST BASIN	12-0004-014-01	5.9	3.3	
LOUGHBOROUGH - WEST BASIN	12-0004-015-01	2.4	6.1	
LOWER BEVERLEY	12-0017-012-01	14.6	1.7	
MAZINAW	18-3430-011-01	1.7	3.7	
MCKAY	18-0000-004-01	10.0	3.2	
MCKAY - THE POND	18-0000-005-01	2.3	3.2	
MINK	18-3690-006-01	1.8	3.5	1
MISSISSIPPI - FIRST LAKE	18-3430-014-01	3.0	3.0	
MOIRA - EAST BASIN	17-0026-002-01	11.0	1.9	
MOIRA - WEST BASIN	17-0026-003-01	9.5	1.5	
MOSQUE - NORTH & SOUTH BASINS	18-3430-017-01	2.1	4.6	
MOSQUE - WEST BASIN	18-3430-018-01	2.4	3.8	
MUSKRAT	18-4810-002-01	10.4	3.4	
NORWAY	18-3490-028-01	2.7	5.1	1
OPINICON	12-0004-016-01	5.1	3.1	
OTTER (BASTARD TWP.)	18-0033-024-01	3.4	2.9	
OTTY	18-0033-025-01	3.4	4.2	
PAUGH	18-3690-009-01	1.9	5.0	1
PIKE	18-0033-028-01	6.8	3.2	
RED HORSE - EAST BASIN	12-0017-020-01	4.3	3.5	
RED HORSE - WEST BASIN	12-0017-013-01	7.9	3.2	
ROBINSON	17-0021-016-01	1.7	2.6	
SAINT ANDREW	17-0035-006-01	10.4	2.9	
SAINT PETER	18-3490-031-01	1.6	4.0	1
SALMON TROUT	18-3490-032-01	5.7	3.6	
SAND	12-0004-017-01	4.5	3.0	
SHABOMEKA	18-3430-034-01	2.4	4.5	
SILVER	18-3430-027-01	3.2	4.3	
SKOOTAMATTA - WEST BASIN	17-0026-005-01	2.4	3.0	
SOUTH	12-0017-019-01	17.5	1.3	
STEENBURG	17-0021-011-01	3.1	3.8	
STOCO - NORTH BASIN	17-0026-008-01	12.9	2.1	1
STOCO - SOUTH BASIN	17-0026-009-01	10.7	2.0	1
THIRTEEN ISLAND	17-0035-015-01	6.7	3.3	
TROY	12-0004-019-01	13.5	1.9	
TWIN SISTER - EAST BASIN	17-0021-012-01	4.0	3.4	
TWIN SISTER - WEST BASIN	17-0021-013-01	3.7	3.0	
WEST (SHEFFIELD TWP.)	17-0035-016-01	4.7	3.8	
WHITE	18-3490-039-01	5.0	2.9	

---

1 less than six sets of measurements

A stable fish population, often lake trout, provides a fair angling catch. The lake is well suited for a wide variety of recreational pursuits including water contact activities such as swimming and bathing.

At the other end of the scale are eutrophic (enriched) lakes. Eutrophic lakes have high concentrations of chlorophyll and poor water clarity. Eutrophic lakes are generally shallow lakes (less than 10 m). Weed growth around the shoreline may be a nuisance. Fish populations do not include lake trout but angling success is better than for oligotrophic lakes. There is a good probability of one or more algal blooms developing in late summer or early fall. Under conditions of advanced eutrophy the lake may sustain a prolonged bloom from June to September.

Mesotrophic (moderately enriched) lakes occupy an intermediate position in the classification scheme. They are intermediate with respect to depth, chlorophyll concentration, water clarity, and weeds. They may contain both warm and cold water fish populations.

While changes from trophic state do not occur at sharply defined stages, numeric criterea are useful to define this classification scheme. The mean values for Secchi disc visibility and chlorophyll concentration presented in table 1 can be used to rank the enrichment status of lakes in the

1986 Self Help program according to the classification scheme in the following table.

Ministry of the Environment Secchi disc - chlorophyll a Lake Enrichment Status Classification Scheme.

Enrichment Status	Secchi disc (m)	Chlorophyll (ug/L)	Number of lakes
oligotrophic	>5	<3	12
mesotrophic	3 - 5	3 - 6	47
eutrophic	<3	>6	31

As reported above in the Methods Section, the laboratory introduced a change in the procedure for the analysis of chlorophyll in 1985. A comparative study of the two procedures conducted by the Ministry of the Environment showed the use of the nylon filter increases the recovery of chlorophyll from lake water samples by 50%.

The chlorophyll concentration criteria for the trophic classification of lakes in the above table have been revised upwards from those used in previous years' reports to take into account the increased recovery of chlorophyll by the improvement in the analytical methodology.

A lake that is classified in one tropic category by its Secchi disc visibility depth may be classified in another category by its mean chlorophyll concentration.
For the purpose of the above table, a lake was placed in the more productive category based on either its seasonal mean chlorophyll concentration or its seasonal mean Secchi disc

visibility depth. Thus, a lake that had a mean chlorophyll concentration indicative of mesotrophy and a mean Secchi disc visibility depth indicative of eutrophy was classified as an eutrophic lake. In this way, the results of the 1986 Self Help water quality monitoring program indicate that thirteen percent (13%) are oligotrophic, fifty two percent (52%) are mesotrophic and thirty four percent (34%) are eutrophic. With the possible exception of Hay Bay, no lake was so completely enriched to be entirely unsuitable for water oriented recreational use such as swimming.

3.2 Seasonal Variability within Lakes

When adequate seasonal data were collected, the results show that algae growth varies in intensity in some lakes at different times of the year. Algal populations contain many different types of algae such as diatoms, blue-green algae, green algae, and flagellated algae. Seasonal succession in the composition of the algal population is partly responsible for some of the variability in the levels present in the lake at any given time. Successional changes are due to seasonal changes in water temperature, sunlight, and the availability of nutrients such as phosphorus, nitrogen and silica.

In lakes where a seasonal influence was evident, the predominant trend was one of gradually rising chlorophyll concentrations as the summer progressed, culminating in peak

concentrations, generally sometime in late August or early September. Almost invariably, the seasonal increases in chlorophyll concentrations were accompanied by a decline in Secchi disc visibility depths. The loss in water clarity is therefore almost certainly the result of increased algal chlorophyll.

The increases in chlorophyll during the summer months are likely due to profusions of blue-green algae after the depletion of nitrogen by a greater variety of algae in the spring. Blue-green algae can fix atmospheric nitrogen and have a competitive advantage later in the season over other types of algae when nitrogen is in scarce supply.

A seasonal pattern of increasing chlorophyll concentrations and decreasing water clarity was most apparent in Black, Christie and Pike Lakes, but was observed in a number of other lakes as well. The individual interpretive lake summaries in the appendix comment upon seasonality in algal phytoplankton populations where they occur.

In contrast to the pattern of seasonally increasing algal growth there are a few lakes that experienced a marked decline in algae in late May or early June. This type of spring decline was most striking in the North Bay of Buck Lake. Spring declines in algae have been reported in other lakes and are attributed to a die off of spring species,

sinking of the heavier diatoms, grazing by zooplankton and depletion of nutrients in the euphotic zone.

Frequent surges in nutrient concentrations in shallow lakes by diffusion of nutrients from sediments or by wave induced mixing and other disturbance of bottom sediments may lead to more episodic changes in algal levels than in deeper stratified lakes.

Examples of lakes with apparently random peaks in chlorophyll concentration that do not conform to any obvious seasonal pattern are the east basin of Loughborough Lake (isolated peak chlorophyll concentration of 14.2 ug/L on July 7) McKay Lake (isolated peak chlorophyll concentration of 37.3 ug/L on July 23) Silver Lake (isolated peak chlorophyll concentration of 12.4 ug/L on September 8) and South Lake (many recurring peaks in chlorophyll concentration ranging from 12.1 ug/L to 42.1 ug/L between August 13 and October 17).

3.3 Annual Variability within Lakes

In the preceding section, the 1986 results were examined and discussed primarily for the purpose of providing a better understanding of a lake's water quality as it occurs within a single year.

A matter of greater interest is the variability in water quality which occurs from year to year. The Self Help Program includes a considerable number of lakes for which a record now exists for an ever increasing number of consecutive years. This record will ultimately prove useful in separating any emerging long term trends from annual variability in water quality conditions due to climatic and other natural factors.

As already pointed out above, the laboratory in 1985 introduced an improvement to the analytical procedure for chlorophyll determinations. The improvement has increased the recovery of chlorophyll from lake water samples by fifty per-cent. No adjustment has been made to any to the chlorophyll data presented in this report to account for the discrepancy in chlorophyll recovery efficiency between the two procedures. That means that unless chlorophyll concentration values for 1985 and 1986 exceed previously reported values for a lake by more than 50 per-cent (1.5 times) the lake cannot be said to have experienced an increase in productivity. Direct comparisons of the results reported can be made only between 1985 and 1986 and among the results for 1984 and previous years. Results for 1984 and previous years should be increased by a factor of 1.5 for comparison with 1985 and 1986 results. Long term comparisons including 1985 and 1986 results can be made with this correction.

Concerning the 1986 results, the most evident finding was a widespread and generalized increase from 1985 in chlorophyll concentration values. An increase in chlorophyll concentration was detected at 41 sampling locations whereas a decrease in chlorophyll concentrations was detected at only 22 sampling locations. For other sampling locations, either 1985 data was not collected, there was no change in chlorophyll concentration from 1985 to 1986, or too few samples (less than six 6) were collected for a valid comparison to be made between years.

The increase in chlorophyll concentration was matched by a corresponding decline in water clarity in all but a few lakes. In fact, of the lakes in the 1986 program where sampling was adequate to make a valid comparison between years, all but 14 lakes experienced a decline in water clarity from 1985 conditions.

Considering that the pattern of a decline in water clarity and increase in chlorophyll concentrations was so common, affecting most of the lakes in the program, it is apparent that this pattern must be due to some widespread influence that all the lakes share in common such as climate.

While no cottager has to be reminded of the unusually wet weather we experienced during the summer of 1986, rainfall data from the Environment Canada meteorological station at

the Kingston airport are useful in examining this possibility. The rainfall amounts recorded at the Kingston airport for the 1986 Self Help program sampling months of April to October inclusive are compared with other recent years and the long term norm in the following table.

Comparison of monthly precipitation (mm) for the growing season months recorded by Environment Canada at Kingston

Month	1983	1984	1985	1986	Normal
April	84.8	155.2	47.7	48.8	69.6
May	39.6	94.2	76.6	80.6	71.0
June	71.5	45.4	51.8	131.6	64.0
July	98.6	41.3	67.4	74.6	53.2
August	50.8	194.0	100.8	129.2	76.2
September	142.2	41.2	72.2	174.4	80.9
October	97.6	25.2	84.6	81.8	77.1
totals	585.1	596.5	501.1	721.0	492.0

Rainfall for the entire April to October period during 1986 was fifty per-cent above normal and more than twice the normal amounts for June and September.

This unusually wet weather undoubtedly resulted in a lot more phosphorus and nitrogen entering the lakes in rainfall and runoff. More phosphorus and nitrogen entering the lakes means an increased availability of these nutrients for the growth of algae and hence possibly the explanation of the increase in chlorophyll concentrations in such a large number of lakes during 1986.

Despite this "rainfall" effect, not all lakes experienced a deterioration in water quality. The water quality of 22 lakes in the 1986 program, particularly for well flushed systems, improved. They experienced a decrease in chlorophyll concentrations from 1985 levels and in some cases improved water clarity as well. Examples of these lakes are Christie, Desert, Gananoque, Jeffreys (Olmstead), Mississippi, Moira, Sand, Salmon Trout and Stoco Lakes.

Stoco Lake was the subject of a water quality investigation during 1984 in response to complaints of nuisance algae conditions. The nuisance conditions were due to the accumulation of a blue-green algal bloom by a light breeze that probably just skimmed the surface of the lake and concentrated a large mass of algae from the open lake along a windward shore. The local cottage association initiated a sampling program on the lake to monitor their lake. Results from the 1986 sampling on Stoco Lake demonstrate a second year of continuing improvement in the water quality of Stoco Lake since the occurrence of the algal bloom in 1984.

Stoco, Kamaniskeg, Moira and Muskrat Lakes all receive treated domestic waste from the municipalities bordering their respective shores. Improvements to the sewage treatment process were made at the Village of Madoc on Moira Lake in 1973, at the Village of Tweed on Stoco Lake in 1975 and at the Village of Cobden on Muskrat Lake in 1981.

Notwithstanding the algal bloom on Stoco Lake during 1984, the Self Help program results continue to demonstrate improved water quality conditions in these lakes since the introduction of improved waste treatment practices and other efforts to reduce nutrient inputs from within their watersheds. This situation parallels similar improvements observed in the water quality of the lower Great Lakes and the Bay of Quinte as a result of municipal pollution and phosphorus control measures implemented during the 1970's.

Other lakes appear to have experienced some deterioration in water quality over the shorter term, most notably Crowe, Mazinaw, Joeperry and the North Bay of Buck Lake as examples.

The North Bay of Buck Lake has experienced a continual loss of water quality in terms of increasing chlorophyll concentrations and decreasing Secchi disc visibility depth since about 1983. Chlorophyll concentrations for 1985 and 1986 of 5.1 ug/L at the north end of the North Bay are more than 1.5 times higher than a historical average chlorophyll concentration of 2.7 ug/L for the period 1975 to 1982. The North Bay of Buck Lake was identified as sensitive to nutrients (phosphorus) by the Ministry of the Environment after surveys of water quality in Buck Lake carried out in 1972 and 1975.

However, it is still difficult at this stage to determine how many consecutive years of measurements are required on these lakes with apparent trends in their annual mean Secchi disc visibility and chlorophyll concentrations to see if we are merely observing natural fluctuations about a long term steady state condition or whether a gradual shift in lake trophic state might be occurring. Further monitoring is required on lakes to determine normal variability and to see if changes detected in their water quality are perhaps cyclical or whether these changes have become a permanent feature of the lake. Normal variability due to climate and other natural factors is sufficient to prevent a definitive trend through time analysis at present.

Other lakes appear to have enough long term stability in mean chlorophyll concentration and mean Secchi disc visibility depth from year to year to confirm the absence of any trends. Examples of these lakes are Brule, Charleston, Davern, Diamond Dempseys, Devil, Diamond, Dickey, Limerick and Otter.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The Self Help Program in the province of Ontario and in the Southeastern Region in particular has been invaluable in establishing a wealth of information concerning the water quality conditions of inland lakes. With the limited staff

and other resources and the many hundreds of lakes in the region, the acquisition of water quality data on a regular yearly basis from any significant number of lakes would otherwise be all but impossible. The Self Help Program provides the Ministry of the Environment the opportunity to determine the enrichment status and water quality variability of our lakes on an on going basis. We are fortunate and grateful for a network of approximately 100 volunteer samplers who have provided many years of highly valuable data.

Each year the Self Help Program provides information that continues to increase our understanding of water quality conditions of lakes in southeastern Ontario. The information reveals basic differences between lakes in terms of their enrichment status, the presence or absence of seasonal patterns in biological productivity, and a better knowledge of between year variations in water quality conditions. For some lakes algal levels and water clarity are predictable from spring to fall and the seasonal average chlorophyll concentration and mean Secchi disc visibility depth is fairly stable from year to year. For other lakes a predictable pattern has not become evident. It is important that efforts continue to characterize as many lakes as possible.

The enrollment of lakes in the Self Help Program is diverse enough in terms of geographic distribution to provide a broad picture of the water quality conditions in the Southeastern Region of Ontario. In general, the picture that emerges is one of very low biological productivity and excellent water quality. Water quality in most lakes is well suited for a wide variety of recreational pursuits including water contact use such as swimming and bathing. Only a few bodies of water, such as Hay Bay for example, have chlorophyll concentrations high enough to possibly interfere with their water contact recreational use and enjoyment. It would be impossible to generalize about the water quality conditions of our lakes in this manner without the information provided by the network of volunteer samplers through the Self Help Program.

In addition to providing information about the current status of lakes, the data provided through the Self Help Program indicate there is considerable year to year variability in the water quality of our lakes. Concerning the 1986 results, the most common finding is a generalized increase in chlorophyll concentrations and a decrease in Secchi disc visibility depths in comparison with the 1985 results. The deterioration in water quality coincides with one of the wettest summers on record. The unusually wet weather experienced during the summer resulted in a lot more phosphorus and nitrogen entering the lakes in rainfall and

land runoff. The increased availability of these nutrients in the lakes likely explains the widespread increase in chlorophyll concentrations detected during 1986.

Year to year variability of some lakes is quite considerable and more than enough to obscure any trends in water quality that might be due to mans' activities. The effect of shoreline development such as clearing shorelands for building roads and cottage construction and seepage from septic tank installations is often subtle and gradual. Unlike that due to climatic conditions the effect of mans' activities is cumulative. It is essential that we have long term data, probably on a continuous basis, to identify any emerging trends with regard to these annual variations in water quality. The water clarity and chlorophyll measurements provided through the Self Help Program will establish the necessary record against which any future changes in the water quality of our lakes may be evaluated.

The identification of trends is important in directing and assessing the effectiveness of lake management decisions. We do not want to inappropriately restrict development on a lake. On the other hand, we must be prepared to impose strict land use controls if an increase in shoreline development is going to jeopardize water quality of a lake.

The Self Help Program provides a basis for input into land use planning decisions for lakes in Ontario. The data is used to assist with the establishment of guidelines for the capacity of a lake to support shoreline development. These guidelines are used by municipalities in drafting land use policies for Official Plans and zoning by-laws. An Official Plan is a municipal document that sets out the general objectives and the policies that guide future land use within a municipality including land use around lakes within their jurisdiction. Zoning by-laws are specific rules and regulations that are used to implement the Official Plan.

The information is also used by the Ministry of the Environment when providing comment on the water quality implications of lakefront development proposals to the Ministry of Housing and to the Ontario Municipal Board. Our comments often require that the developer incorporate measures that will reduce the impact of a development proposal on water quality such as increased set backs for cottages and septic tanks, oversized lots and the preservation of environmentally sensitive areas.

Every one in the Self Help Program is encouraged to continue their participation during 1987. Sampling should be carried out regularly and consistently over the entire period of availability at the lake. Weekly sampling is desirable to define seasonal cycles on lakes where they exist. As a

minimum, a program should encompass the three months of June, July and August when lakes receive most of their use. These months are often when chlorophyll concentrations are their highest. If a sampling is conducted during May and September as well as during June, July and August then the presence or absence of chlorophyll peaks in the spring and fall can be confirmed.

Cottagers who own property on a lake not enrolled in the Self Help Program are encouraged to contact the Ministry of the Environment for advice and assistance in establishing a sampling program on their lake.

The Ministry of the Environment has a responsibility to minimize the potential water quality effects of further shoreline development on lakes. Existing cottage owners can also play an important role in the protection of their lakes. The following Section outlines some of the steps cottagers can adopt to limit nutrient inputs to their lakes and thereby help preserve their water quality.

5.0 PROTECTION OF THE LAKE

In order to prevent problems from developing there are a number of actions and safeguards that cottagers can take. Cottaging impacts are potentially greater significance than

other land uses within a watershed because of their greater proximity to the lake. Of the management options available for dealing with water quality protection, the most effective is prevention. Phosphorus has been identified as a critical element in eutrophication. Phosphorus more than any other nutrient promotes the growth of weeds and algae in a lake. Phosphorus is present in a lake naturally but also occurs as a result of mans' activities. Phosphorus originates in overland runoff, from agricultural practices within the watershed of a lake and by seepage from septic tank systems. Care must be taken to minimize additional phosphorus input from cottage development. Following is a list of suggestions that cottagers can follow to limit phosphorus inputs to the lake.

1) New cottage construction and septic tank systems should be sited well back from the lake. This practice allows phosphorus in runoff and seepage from the tile field to be absorbed by soil and vegetation rather than reaching the lake. Setbacks have the additional advantage of preserving the natural scenic beauty of the shore by preventing development from intruding unnaturally upon the lake.

2) Building site preparation and construction activities should be carried out in a manner which will minimize disruption to the soil and vegetation on the property.

All areas that are exposed during construction should be re-planted as soon as possible to prevent runoff and erosion.

3) Sewage disposal systems must be constructed and installed in compliance with Provincial Regulations and should be properly maintained. Seepage of leachate from improperly located or malfunctioning septic tank tile field systems can contribute substantial amounts of phosphorus to the lake. Septic tanks should be periodically pumped out. The area over the tile bed should be grassed and left open to sunlight and wind to encourage evapotranspiration. Protect the tile field bed from compaction by vehicular traffic including snow mobiles. Snowmobiles compact the snow and this may cause frost damage to the tiles. Check the system every year for damp spots or ponding. If a problem is apparent or suspected contact the local District Office of the Ministry of the Environment for guidance.

4) Minimize the quantity of water used at the cottage to avoid overloading the septic tank system. Dishwashers and automatic washing machines use large volumes of water. Moreover, automatic dishwashers require the use of high phosphate detergents which should not be used at the cottage. Laundry should be returned to the city.

5) Do not fertilize cottage lawns. Excess application could wash off into the lake and may end up promoting unwanted nuisance aquatic weed growths.

6) Do not bathe or shampoo in the lake. Many people find this custom offensive and in this day and age when most of us embrace an environmental ethic such practices should not occur.

7) The shallow near shore or "littoral" zone supports most of the plant and animal life found in a lake. Disruption of any part of this life support ecosystem threatens the entire cycle of life in the lake. In particular, habitat for fish and other wildlife may be destroyed. Before undertaking any shoreline modification activities such as dredging or filling, contact the Ministry of Natural Resources for advice. Prior approval may be required under the Navigable Waters Protection Act or the Fisheries Act.

8) Preserve the natural shoreline of the lake. Retain a protective buffer of trees, shrubs and other ground cover between your cottage and the lake. Vegetation slows storm and melt water runoff and filters contaminants from roads, roofs, patios, and parking lots. While once considered natural, it is now known that such runoff contains phosphorus and nitrogen from

soil particles, fertilizer residues and animal waste.

9) On lots where the natural ground cover has been lost, cottagers should reintroduce vegetation to the shoreland. The Ministry of Natural Resources introduced a shoreland restoration program on Christie Lake near Perth during 1984 as a pilot project in Ontario. The program involves the active participation of cottage associations in returning shorelines to their natural character with cuttings of herbaceous shrubs native to the lake environment. Cuttings are provided free of charge from a nursery established specifically for this purpose. The main species that are planted are sweet gale, meadow sweet, willow, red osier dog wood and Virginia creeper. Since 1984 the program has been extended to Black and Farren Lakes. For more information about this program contact the Ministry of Natural Resources.

10) Participate in the Ministry of the Environment Cottagers lake water quality monitoring Self Help Program. In addition to contributing scientific data about the water quality conditions of our lakes, the Self Help Program involves cottagers in learning about lake ecology and good management practices for the protection of lakes.

6.0 A P P E N D I X

Lake locations and morphometry, 1986 chlorophyll concentrations and Secchi disc visibility depths, and summary of seasonal mean results from previous years for lakes in the 1986 Ministry of the Environment Southeastern Region Cottagers Self Help Program.

BAGOT LONG LAKE

Insufficient sampling was carried out to obtain any meaningful results. A minimum of six sets of measurements each year is necessary to adequately characterize the water quality of a lake and preferably 12 or more sets of measurements evenly timed through out the ice free season from May until October to define any seasonal trends if they are present.

LAKE : BABOT LONG LAKE
TWP : BABOT
COUNTY : RENFREW

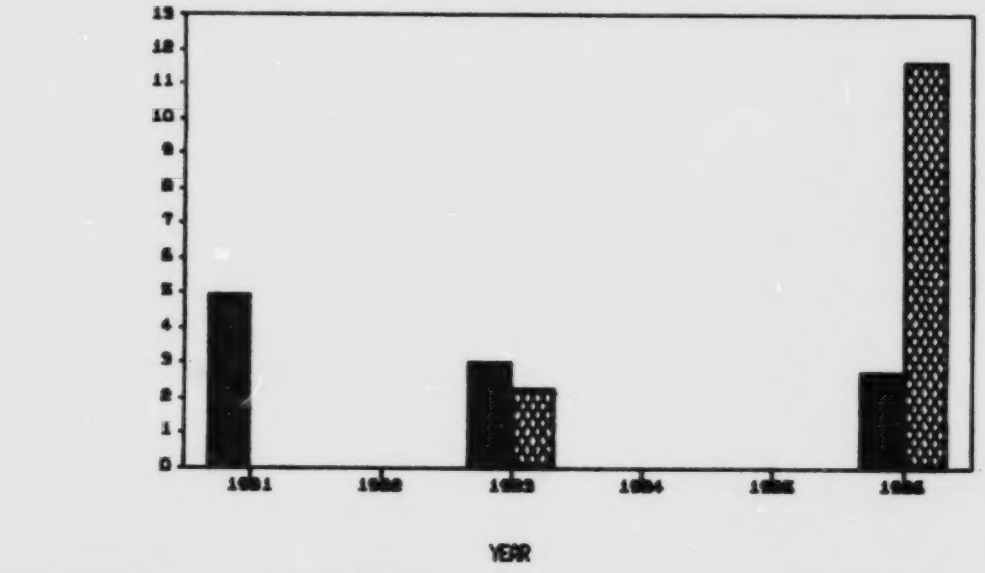
ID NUMBER : 18-3490-041-01

WATERSHED AREA	: 4.41	sq.km	SHORELINE	: 9.00	km.
SURFACE AREA	: 56.0	ha.	COTTAGES	: 28	
MAX DEPTH	: 12.20	m.	RESORTS	: 0	
VOLUME	: 2.62	mill cu. m.	% CROWN LAND	: 70	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/15/86	4.1	
07/06/86	2.4	19.8
08/09/86	1.6	3.5
MEAN	2.7	11.6
MAX	4.1	19.8
MIN	1.6	3.5
N	3	2
SD	1.28	11.53

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1983 $	3.0	2.2
1986 $	2.7	11.6
MEAN	3.5	6.9
MAX	4.9	11.6
MIN	2.7	2.2
N	3	2
SD	1.19	6.65

NOTE : $ Based on less than 6 readings.
$$ Recreational lakes included.



BASS LAKE

Insufficient sampling was carried out on Bass Lake during 1986 to reach any definitive conclusions about water quality relative to past years. Sampling was taken over by a new volunteer. An apparent decline in water quality might be a subjective difference in interpretation of Secchi disc visibility depth between the new volunteer and the previous volunteer.

Even with an apparent decline Secchi in disc visibility depth, water clarity continues to be exellent and chlorophyll concentrations in Bass Lake are low.

The long term record of water quality sampling of 10 years was recognized by the presentation of a plaque to Mr. Dave Climenhage on behalf of the Bass Lake Cottage Association at an awards banquet for the Self Help Program participants held in Kingston on September 19, 1986.

LAKE : BASS LAKE
TWP : REAR OF LEEDS & LANSDOWNE
COUNTY : LEEDS

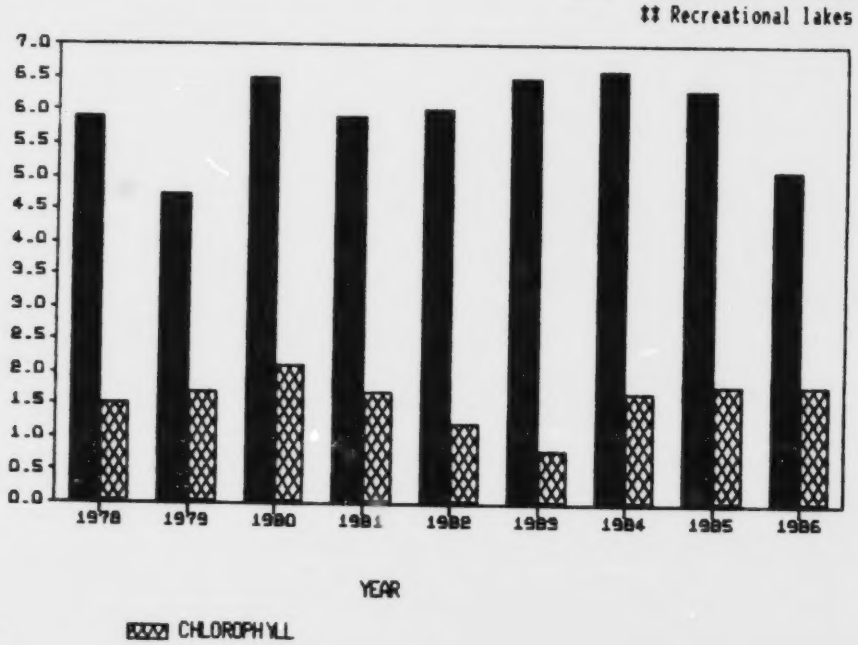
ID NUMBER : 12-0017-001-01

WATERSHED AREA	: 14.89	sq.km	SHORELINE	: 8.2	km.
SURFACE AREA	: 76.89	ha.	COTTAGES	: 67 (1975)	
MAX DEPTH	: 25.9	m.	RESORTS	: 0	
VOLUME	: 8.67	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/24/86	4.9	1.7
08/25/86	4.6	2.7
08/31/86	5.5	1.6
09/14/86	5.5	1.9
09/24/86	5.0	1.4
MEAN	5.1	1.8
MAX	5.5	2.7
MIN	4.6	1.4
N	5	5
SD	0.39	0.50

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1977	6.6	1.0
1978	5.9	1.5
1979	4.7	1.7
1980	6.5	2.1
1981	5.9	1.7
1982	6.0	1.2
1983	6.5	0.8
1984	6.6	1.7
1985	6.3	1.8
1986 ‡	5.1	1.8
MEAN	6.0	1.5
MAX	6.6	2.1
MIN	4.7	0.8
N	10	10
SD	0.65	0.41

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



BEAVER LAKE

A decrease in water clarity and an increase in chlorophyll concentrations compared to 1985 was recorded in both the North Basin and the South Basin of Beaver Lake. This pattern was observed in other lakes included in the Self Help Program during 1986 and might be a result of the unusually wet weather experienced last summer.

The shallow South Basin is slighty more productive than the deeper North Basin. Chlorophyll concentrations indicate that both basins of Beaver Lake are free of nuisance levels of algae.

The Beaver Lake Protective Association is cautioned that whole scale removal of rooted aquatic weeds by their harvesting operation could result in increased levels of chloropyll by reducing the competition for nutrients by phytoplankton from rooted aquatic plants. Harvesting should be confined to the minimum areas required to facilitate swimming and navigation.

LAKE : BEAVER LAKE
TWP : SHEFFIELD
COUNTY : LENNOX & ADDINGTON

ID NUMBER : 17-0031-001-01

WATERSHED AREA	: 534	sq.km	SHORELINE	: 15.6	km.
SURFACE AREA	: 280	ha.	COTTAGES	: 143	
MAX DEPTH	: 6.10	m.	RESORTS	: 1 (10)	
VOLUME	: 9.2	mill cu. m.	% CROWN LAND	: 0	

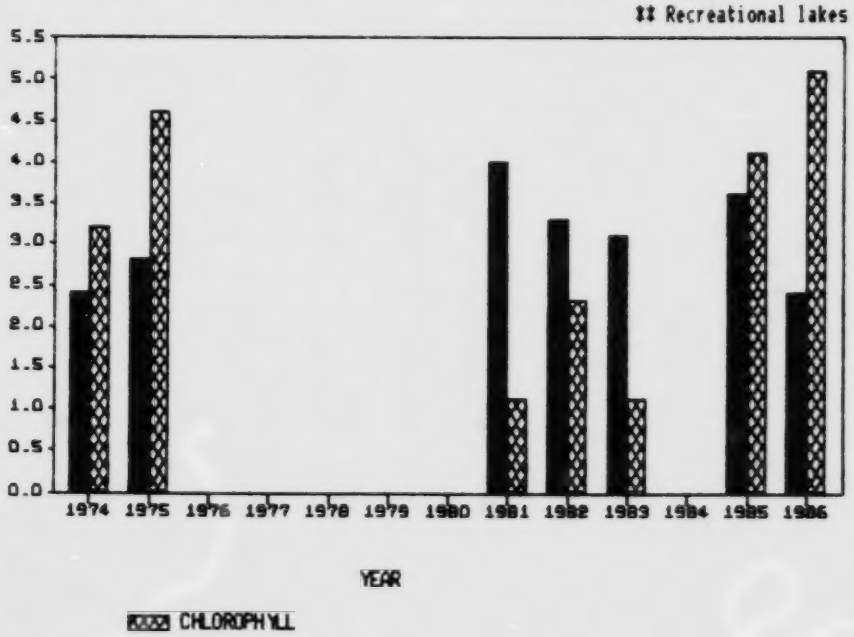
NORTH BASIN

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/23/86	2.4	3.9
07/30/86	2.1	4.7
08/06/86	2.7	5.1
08/13/86	3.1	7.0
08/20/86	2.4	4.9
08/27/86	2.2	
MEAN	2.4	5.1
MAX	3.1	7.0
MIN	2.1	3.9
N	6	5
SD	0.37	1.15

NORTH BASIN

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1974	2.4	3.2
1975 ‡‡	2.8	4.6
1981 ‡‡	4.0	1.1
1982	3.3	2.3
1983 ‡‡	3.1	1.1
1985 ‡‡	3.6	4.1
1986	2.4	5.1
MEAN	3.0	3.0
MAX	4.0	5.1
MIN	2.4	1.1
N	7	7
SD	0.60	1.63

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



LAKE : BEAVER LAKE
TWP : SHEFFIELD
COUNTY : LENNOX & ADDINGTON

ID NUMBER : 17-0031-001-01

WATERSHED AREA	: 534	sq.km	SHORELINE	: 15.6	km.
SURFACE AREA	: 280	ha.	COTTAGES	: 143	
MAX DEPTH	: 6.10	m.	RESORTS	: 1 (10)	
VOLUME	: 9.2	mill cu. m.	% CROWN LAND	: 0	

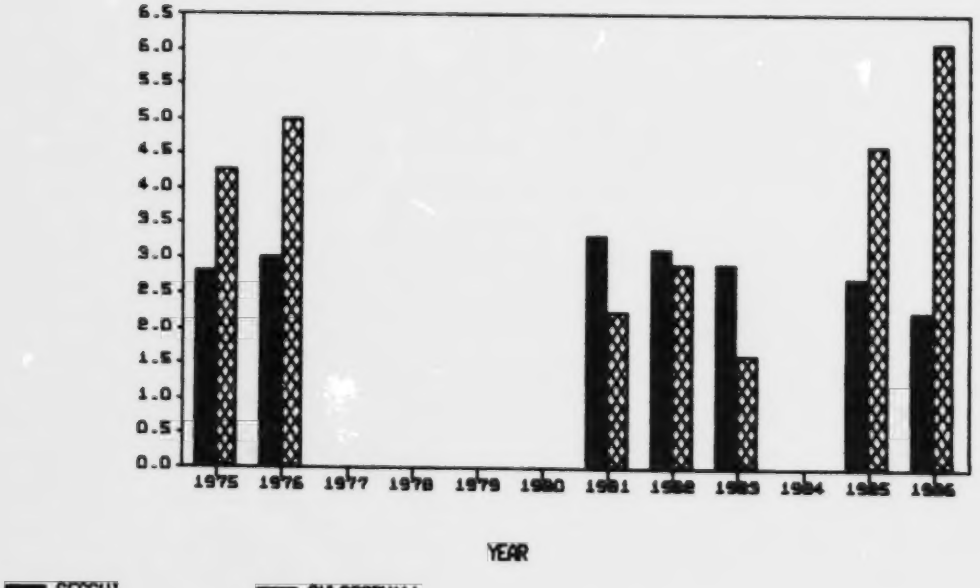
SOUTH BASIN

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/16/86	2.3	4.9
07/24/86	2.7	5.1
08/01/86	2.7	5.0
08/07/86	2.3	5.7
08/26/86	2.1	7.8
09/03/86	1.9	5.6
09/10/86	2.0	7.6
09/16/86	2.0	7.8
MEAN	2.2	6.1
MAX	2.7	7.8
MIN	1.9	4.9
N	8	8
SD	0.31	1.31

SOUTH BASIN

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	2.8	4.3
1976 ‡	3.0	5.0
1981 ‡‡	3.3	2.2
1982 ‡	3.1	2.9
1983 ‡‡	2.9	1.6
1985 ‡‡	2.7	4.6
1986	2.2	6.1
MEAN	2.8	3.8
MAX	3.3	6.1
MIN	2.2	1.6
N	7	7
SD	0.35	1.62

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



BIG GULL (CLARENDON) LAKE

An exellent sampling program was carried out with 14 samples collected from May 15 to October 5. There was very little seasonal variation in either chlorophyll concentrations or water clarity.

Both the current results and the historical record demonstrate that Big Gull Lake has exellent water quality well suited for a diversity of recreational pursuits including water contact activities such as swimming and bathing. Higher chlorophyll concentrations in 1985 and 1986 than in most prior years can be attributed to an improvement in the analytical procedure for chlorophyll introduced by the laboratory in 1985.

An awards presentation was made to Mr. D. L. Rigsby of the Pinnacle Point Cottage Association at a banquet held in Kingston on September 19, 1986 for the Association's 10 year record of particpation in the Self Help Program.

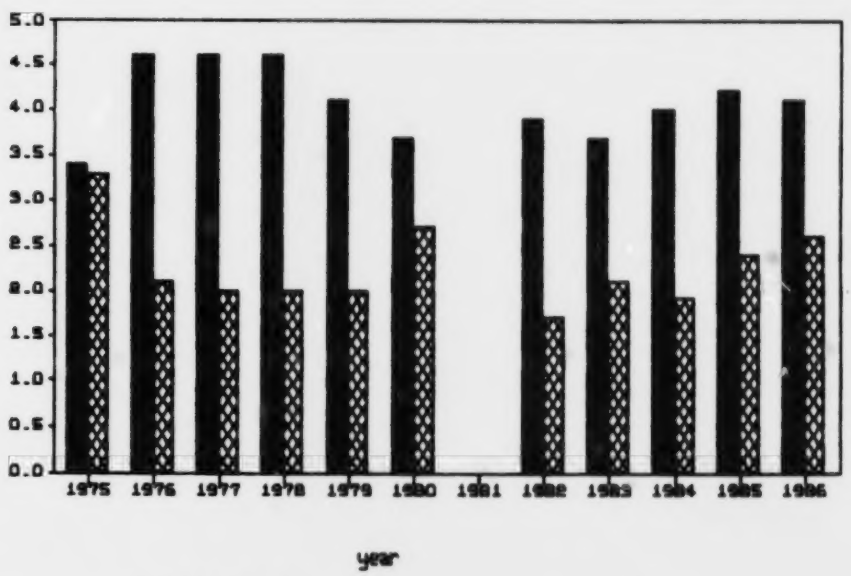
LAKE : BIG GULL (CLARENDON) LAKE ID NUMBER : 18-3430-003-01
TWP : KENNEBEC, OLDEN, BARRIE, CLARENDON
COUNTY : FRONTENAC

WATERSHED AREA	: 137.00	sq.km	SHORELINE	: 89.00 km.
SURFACE AREA	: 236.0	ha.	COTTAGES	: 280 (1974)
MAX DEPTH	: 26.00	m.	RESORTS	: 10 (156)
VOLUME	: 919.70	mill cu. m.	% CROWN LAND	: 25

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/25/86	5.2	
06/09/86	4.9	2.4
06/15/86	4.6	1.3
06/22/86	3.8	3.8
07/01/86	4.2	4.5
07/06/86	3.8	2.9
07/16/86	3.8	2.5
07/21/86	4.0	2.1
08/04/86	4.1	2.3
08/10/86	3.5	2.9
08/25/86	4.3	3.2
09/01/86	4.0	2.2
09/14/86	4.0	2.2
10/05/86	4.1	2.7
MEAN	4.1	2.6
MAX	5.2	4.5
MIN	3.5	1.3
N	14	13
SD	0.46	0.81

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	3.4	3.3
1976	4.6	2.1
1977	4.6	2.0
1978	4.6	2.0
1979 ‡	4.1	2.0
1980 ‡	3.7	2.7
1982	3.9	1.7
1983	3.7	2.1
1984	4.0	1.9
1985	4.2	2.4
1986	4.1	2.6
MEAN	4.0	2.2
MAX	4.6	3.3
MIN	3.4	1.7
N	11	11
SD	0.40	0.46

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



BIG RIDEAU LAKE

Four locations were sampled on Big Rideau Lake during 1986. Muskrat Hole, a small embayment on the north shore of the lake was included in the sampling to assess any water quality affects of Three Buoys Vacations Limited, a houseboat rental operation that located there in 1986.

Only the results for the three open water locations are incorporated into the year end averages for the historical record table.

While there is some minor variabilty in water clarity and chlorophyll concentrations between the various sampling locations, the results indicate Big Rideau Lake has good water quality. If an enhanced recovery of chlorophyll from lake water samples by an improvement in the laboratory procedure for the analysis of chlorophyll introduced in 1985 is taken into account, there had generally been a trend towards lower productivity and better clarity over the past four years.

LAKE : BIG RIDEAU LAKE ID NUMBER : 18-0033-006-01
TWP : NORTH & SOUTH BURGESS & ELMSLEY, BASTARD
COUNTY : LANARK, LEEDS

WATERSHED AREA	: 478.90	sq.km	SHORELINE	: 172.00km.	
SURFACE AREA	: 4700	ha.	COTTAGES	: 1063+12 HOUSES	
MAX DEPTH	: 95.00	m.	RESORTS	: 12 (621)	
VOLUME	: 799.97	mill cu. m.	% CROWN LAND	: 5	

MUSKRAT HOLE

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
04/20/86	1.5	2.3
04/27/86	1.5	3.7
05/11/86	1.5	3.9
05/26/86	1.5	3.4
MEAN	1.5	3.3
MAX	1.5	3.9
MIN	1.5	2.3
N	4	4
SD		0.71

N.SHORE MAIN CHANNEL MUSKRAT HOLE

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
04/20/86	4.6	2.9
04/27/86	4.3	3.0
05/11/86	3.4	4.2
05/26/86	2.8	3.7
MEAN	3.7	3.4
MAX	4.6	4.2
MIN	2.8	2.9
N	4	4
SD	0.83	0.61

BETWEEN SHEEP IS. AND GRAPE POINT

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/24/86	3.7	3.0
07/02/86	3.3	6.5
07/06/86	1.9	3.3
07/13/86	5.2	3.2
08/05/86	3.7	4.4
08/26/86	3.1	4.5
MEAN	3.4	4.1
MAX	5.2	6.5
MIN	1.9	3.0
N	6	6
SD	1.07	1.32

HUDSON BAY

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/27/86	3.7	3.9
06/13/86	3.1	3.0
06/26/86	3.4	2.4
07/02/86	3.0	2.7
07/23/86	3.7	4.1
08/05/86	3.1	5.2
08/11/86	2.7	5.3
09/04/86	2.4	3.9
MEAN	3.1	3.8
MAX	3.7	5.3
MIN	2.4	2.4
N	8	8
SD	0.46	1.08

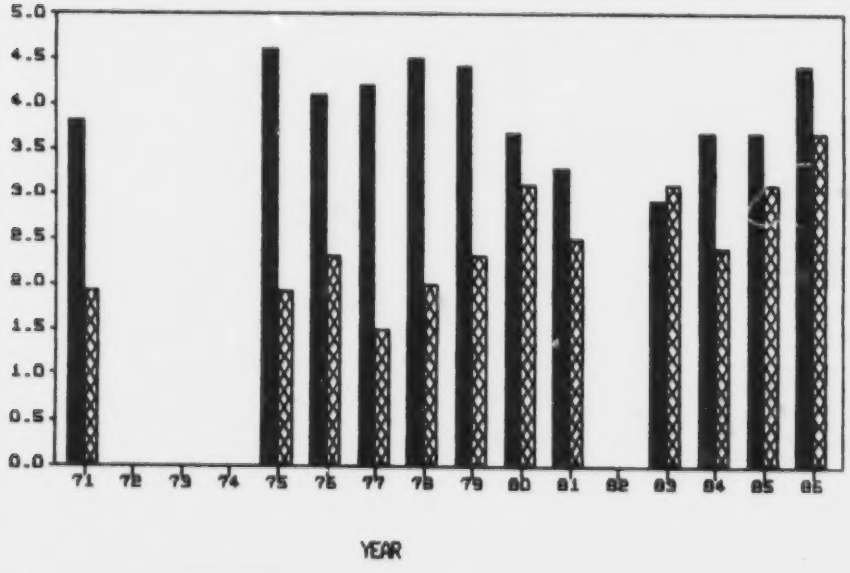
LAKE : BIG RIDEAU LAKE ID NUMBER : 18-0033-006-01
TWP : NORTH & SOUTH BURGESS & ELMSLEY, BASTARD
COUNTY : LANARK, LEEDS

WATERSHED AREA	: 478.90	sq.km	SHORELINE	: 172.00km.
SURFACE AREA	: 4700	ha.	COTTAGES	: 1063+12 HOUSES
MAX DEPTH	: 95.00	m.	RESORTS	: 12 (621)
VOLUME	: 799.97	mill cu. m.	% CROWN LAND	: 5

OPEN WATER LOCATIONS ONLY

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1971 ‡‡	3.8	1.9
1975 ‡‡	4.6	1.9
1976	4.1	2.3
1977	4.2	1.5
1978	4.5	2.0
1979	4.4	2.3
1980 ‡	3.7	3.1
1981 ‡‡	3.3	2.5
1983	2.9	3.1
1984	3.7	2.4
1985	3.7	3.1
1986	4.4	3.7
MEAN	3.9	2.4
MAX	4.6	3.7
MIN	2.9	1.5
N	12	12
SD	0.52	0.65

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



BLACK LAKE

A total of 12 samples collected from the beginning of June to the end of August provided good seasonal coverage.

Chlorophyll concentrations were higher and water clarity poorer during August than earlier in the season, a characteristic shared by a number of lakes in the 1986 Self Help Program including nearby Pike Lake.

Chlorophyll concentrations while higher in August, did not reach nuisance algal levels and water clarity was greater than 3 metres on all sampling occasions.

Higher chlorophyll concentrations in 1985 and 1986 compared with the earlier record are the result improved recovery of chlorophyll at the laboratory by a change in the analytical procedure introduced in 1985. A decrease in water clarity and an increase in chlorophyll concentrations from 1985 to 1986 is a pattern observed in other lakes. This pattern might be a result of the unusually wet weather experienced during the summer.

Both the current results and the historical record indicate that Black Lake has good water quality from a recreational use point of view.

LAKE : BLACK LAKE
TWP : NORTH BURGESS
COUNTY : LANARK

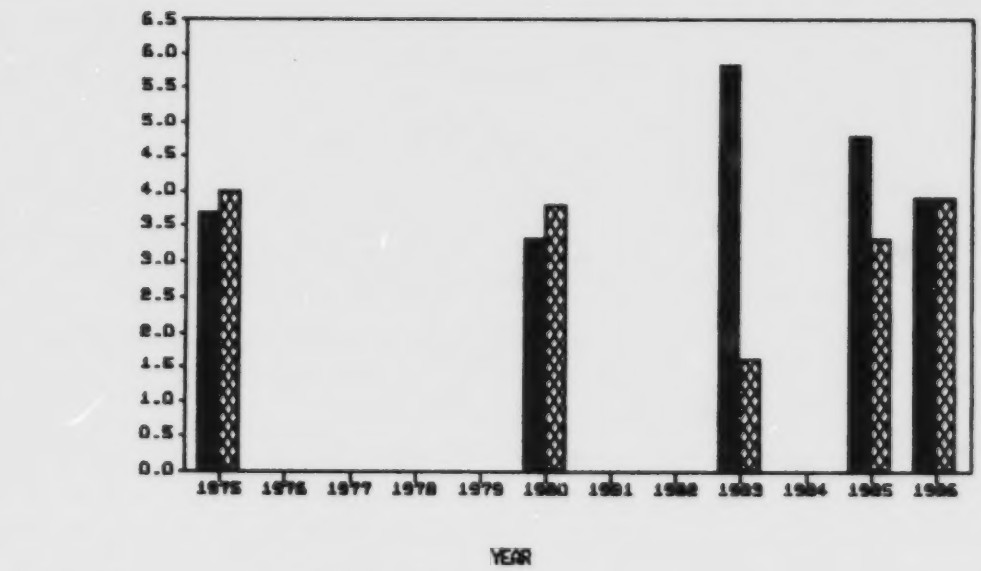
ID NUMBER : 18-0033-026-01

WATERSHED AREA	: 67.1	sq.km	SHORELINE	: 20.1	km.
SURFACE AREA	: 3.42	ha.	COTTAGES	: 188	
MAX DEPTH	: 23.0	m.	RESORTS	: 1	
VOLUME	: 24.84	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/02/86	3.2	4.6
06/09/86	4.6	3.4
06/16/86	5.2	1.3
06/23/86	4.3	2.7
06/30/86	4.3	3.3
07/09/86	3.9	3.7
07/15/86	4.1	2.8
07/21/86	4.2	3.3
07/29/86	3.6	4.1
08/07/86	3.1	6.0
08/19/86	3.1	4.8
08/26/86	3.4	7.9
MEAN	3.9	3.9
MAX	5.2	7.9
MIN	3.1	1.3
N	12	12
SD	0.66	1.71

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	3.7	4.0
1980 ‡	3.3	3.8
1983 ‡‡	5.8	1.6
1985	4.8	3.3
1986	3.9	3.9
MEAN	4.3	3.3
MAX	5.8	4.0
MIN	3.3	1.6
N	5	5
SD	1.00	1.00

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



BLACK BAY (PETAWAWA RIVER)

Twelve samples were collected between mid July and mid October. There appears to be no seasonal variation in the results but the presence or absence of a spring peak in chlorophyll concentrations cannot be confirmed.

A mean Secchi disc visibility depth of 3.3 metres and a mean chlorophyll concentration of 2.6 ug/L indicate Black Bay has very good water quality in terms of water clarity and the absence of problematic levels of algae, respectively.

LAKE : BLACK BAY - PETAWAWA RIVER ID NUMBER : 18-4930-001-01
TWP : PETAWAWA
COUNTY : RENFREW

WATERSHED AREA	: 69.93	sq.km	SHORELINE	: 6.7	km.
SURFACE AREA	:	ha.	COTTAGES	: 34 (1975)	
MAX DEPTH	:	m.	RESORTS	:	
VOLUME	:	mill cu. m.	% CROWN LAND	:	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/11/86	3.3	
07/27/86	3.2	2.0
08/05/86	3.7	3.7
08/13/86	3.4	4.9
08/19/86	3.5	2.2
08/28/86	2.9	2.4
09/10/86	3.1	
09/17/86	3.5	3.0
09/23/86	4.1	1.8
09/30/86	3.4	2.0
10/07/86	3.5	2.1
10/14/86	3.1	2.5
MEAN	3.3	2.6
MAX	4.1	4.9
MIN	2.9	1.8
N	12	10
SD	0.31	0.97

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1986	3.3	2.6

BLACK DONALD LAKE

An excellent sampling program was carried out with 11 samples collected from May 24 to October 26.

The results indicate there is very little seasonal variability in chlorophyll concentrations and water clarity.

Both the 1986 results and the historical record indicate Black Donald Lake has excellent water quality.

Poorer water clarity and higher chlorophyll concentrations in 1986 compared to 1985 results might be a result of the unusually wet weather experienced during the summer.

LAKE : BLACK DONALD LAKE
TWP : BROUGHAM
COUNTY : RENFREW

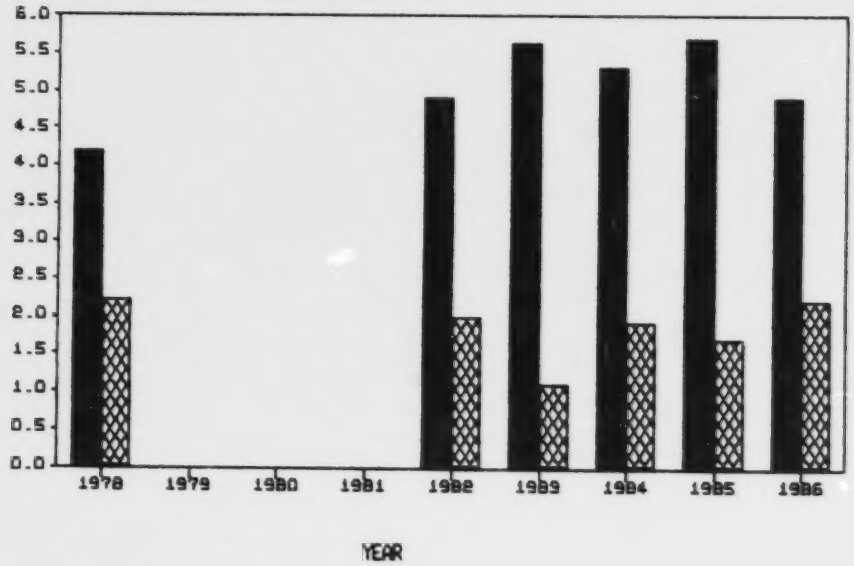
ID NUMBER : 18-3490-043-01

WATERSHED AREA	: 7393.00	sq.km	SHORELINE	:	km.
SURFACE AREA	: 1550.0	ha.	COTTAGES	: 103	
MAX DEPTH	: 44.00	m.	RESORTS	: 2(102)	
VOLUME	:	mill cu. m.	% CROWN LAND	: 20	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/24/86	4.9	1.6
06/15/86	4.3	1.0
07/01/86	5.8	3.7
07/06/86	4.3	2.1
07/13/86	4.6	1.9
07/25/86	3.9	1.8
08/09/86	5.8	1.6
09/01/86	5.5	2.7
09/14/86	5.5	2.0
10/05/86	4.9	2.1
10/26/86	4.6	4.4
MEAN	4.9	2.2
MAX	5.8	4.4
MIN	3.9	1.0
N	11	11
SD	0.65	0.99

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1978 ‡‡	4.2	2.2
1982 ‡	4.9	2.0
1983	5.6	1.1
1984	5.3	1.9
1985	5.7	1.7
1986	4.9	2.2
MEAN	5.1	1.8
MAX	5.7	2.2
MIN	4.2	1.1
N	6	6
SD	0.55	0.41

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



BOBS LAKE

Bobs Lake is composed of a number of different basins and bays that act independently of one another from a water quality point of view.

Sampling locations where sufficient sampling was carried out to adequately characterize water quality conditions exemplified a pattern found in other lakes of reduced water clarity and increased chlorophyll concentrations compared to the 1985 results. This pattern may be the result of the unusually wet weather experienced during the summer.

Higher chlorophyll concentrations in both 1985 and 1986 compared to the historical record can be explained by an improvement to the analytical procedure to increase the recovery and detection of chlorophyll from water samples. The improved analytical procedure was introduced by the laboratory in 1985.

With the possible exception of Mud Bay, the results indicate Bobs Lake has very good water quality. The shallow water of Mud Bay is more productive of chlorophyll and experiences poorer water clarity than the rest of the lake. This is a natural phenomenon characteristic of shallow impoundments by the release of nutrients from inundated sediments.

LAKE : BOB'S LAKE : CROW BAY ID NUMBER : 18-0033-012-01
TWP : BEDFORD
COUNTY : FRONTENAC

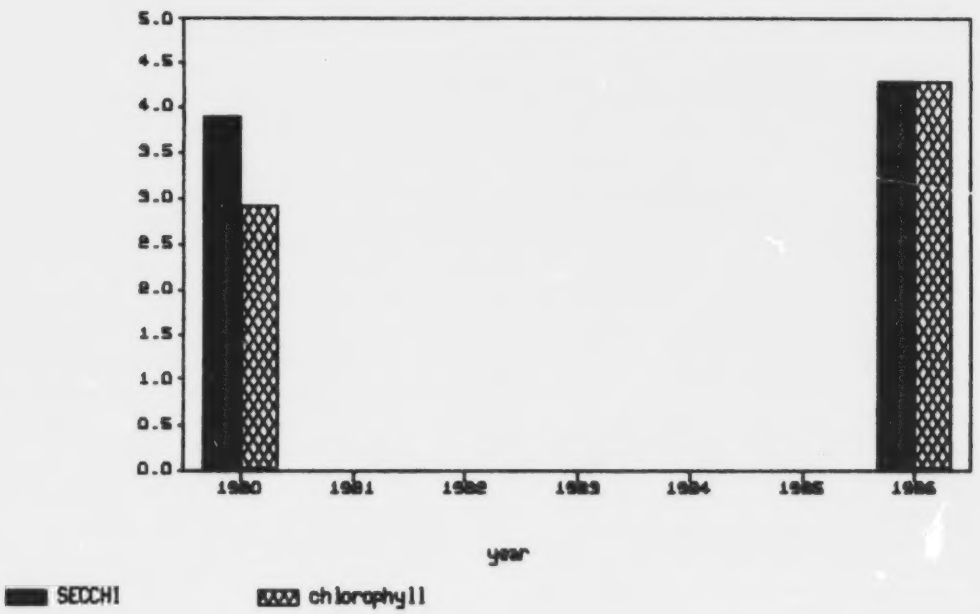
WATERSHED AREA	:	sq.km	SHORELINE	:	km.
SURFACE AREA	:	ha.	COTTAGES	:	
MAX DEPTH	:	m.	RESORTS	:	
VOLUME	:	mill cu. m.	% CROWN LAND	:	

CROW BAY

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
08/14/86	4.3	2.4
08/25/86	4.3	5.0
09/14/86	4.3	5.6
09/25/86	4.3	4.4
MEAN	4.3	4.3
MAX	4.3	5.6
MIN	4.3	2.4
N	4	4
SD		1.39

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1980	3.9	2.9
1986 ‡	4.3	4.3
MEAN	4.1	3.6
MAX	4.3	4.3
MIN	3.9	2.9
N	2	2
SD	0.28	0.99

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



LAKE : BOB'S LAKE : EAST BASIN
TWP : BEDFORD
COUNTY : FRONTENAC

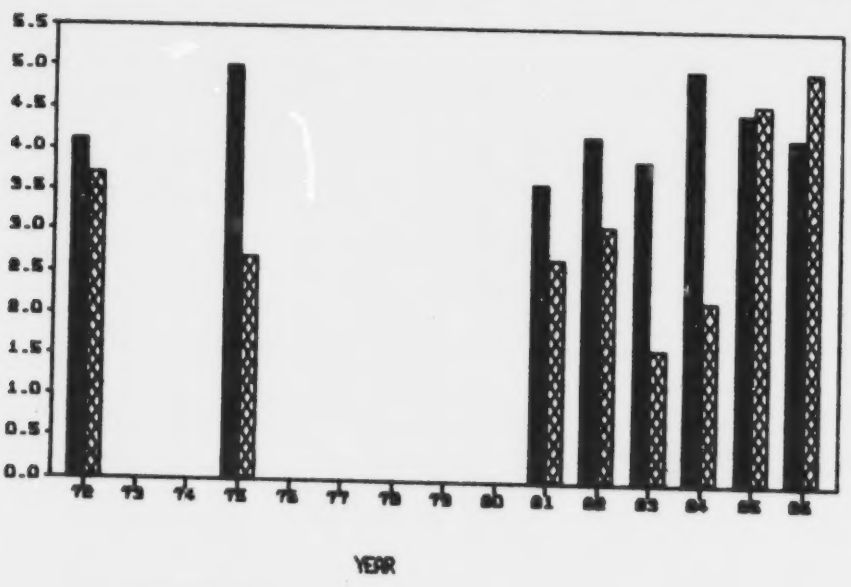
ID NUMBER : 18-0033-010-01

WATERSHED AREA	: 351.32	sq.km	SHORELINE	: 66.00	km.
SURFACE AREA	: 927.0	ha.	COTTAGES	: 187	
MAX DEPTH	: 23.00	m.	RESORTS	: 3(33)	
VOLUME	: 88.57	mill cu. m.	% CROWN LAND	: 2	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/03/86	4.6	4.1
07/15/86	4.6	3.9
07/22/86	4.6	3.0
07/28/86	4.2	4.4
08/11/86	4.6	7.6
08/18/86	4.3	5.6
08/25/86	3.8	8.1
09/02/86	3.7	7.0
09/08/86	4.0	1.6
MEAN	4.2	5.0
MAX	4.6	8.1
MIN	3.7	1.6
N	9	9
SD	0.36	2.20

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1972 ‡‡	4.1	3.7
1975 ‡‡	5.0	2.7
1981	3.6	2.7
1982	4.2	3.1
1983	3.9	1.6
1984 ‡	5.0	2.2
1985	4.5	4.6
1986	4.2	5.0
MEAN	4.3	3.2
MAX	5.0	5.0
MIN	3.6	1.6
N	8	8
SD	0.50	1.17

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



LAKE : BOB'S LAKE : GREEN BAY ID NUMBER : 18-0033-011-01
TWP : BEDFORD
COUNTY : FRONTENAC

WATERSHED AREA	: 22.00	sq.km	SHORELINE	:	km.
SURFACE AREA	: 534.0	ha.	COTTAGES	: 106	
MAX DEPTH	: 26.00	m.	RESORTS	: 5 (54)	
VOLUME	:	mill cu. m.	% CROWN LAND	: 0	

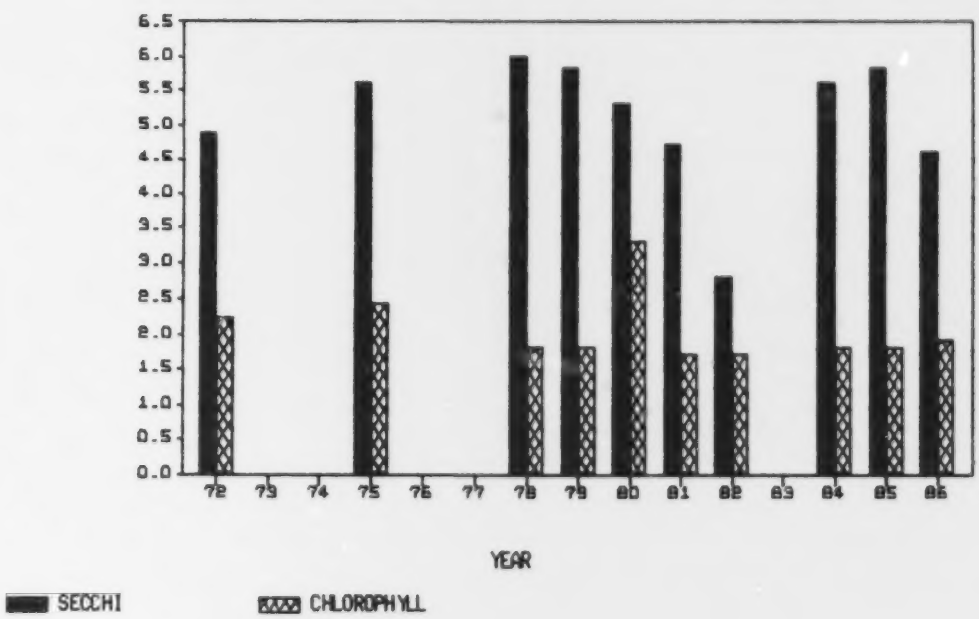
GREEN BAY

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/18/86	4.6	1.3
05/31/86	4.0	2.0
06/14/86	4.6	1.3
06/29/86	4.9	3.2
07/11/86	4.3	1.6
07/28/86	5.5	2.4
08/12/86	4.3	1.9
08/25/86	4.9	2.6
09/14/86	4.6	1.3
09/25/86	5.2	2.4
10/07/86	4.3	1.9
MEAN	4.6	1.9
MAX	5.5	3.2
MIN	4.0	1.3
N	11	11
SD	0.44	0.61

GREEN BAY

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1972 ‡‡	4.9	2.2
1975 ‡‡	5.6	2.4
1978	6.0	1.8
1979 ‡	5.8	1.8
1980 ‡	5.3	3.3
1981 ‡‡	4.7	1.7
1982 ‡	2.8	1.7
1984 ‡	5.6	1.8
1985	5.8	1.8
1986	4.6	1.9
MEAN	5.1	2.0
MAX	6.0	3.3
MIN	2.8	1.7
N	10	10
SD	0.95	0.50

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



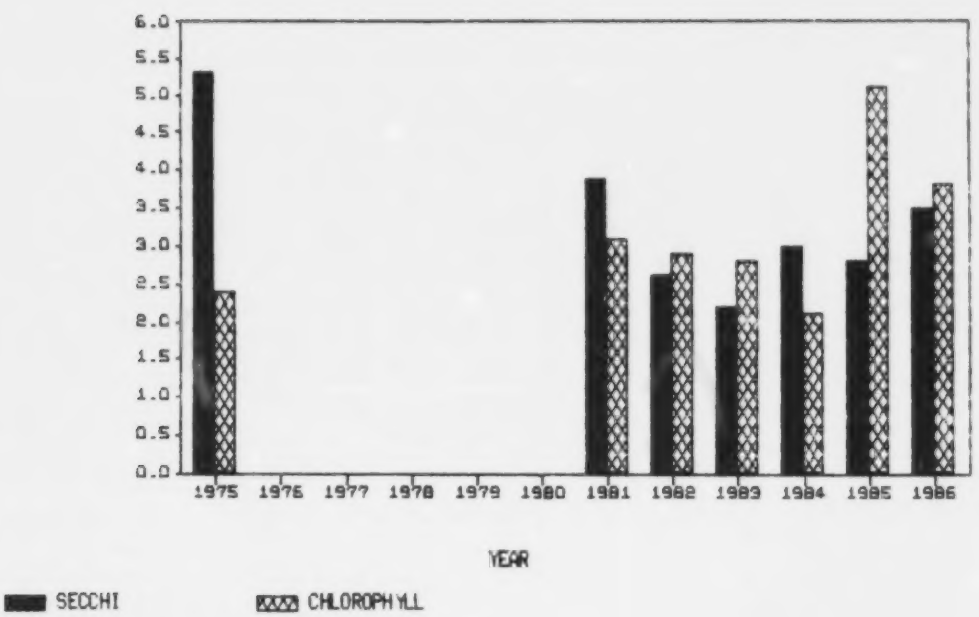
LAKE : BOB'S LAKE : LONG BAY ID NUMBER : 18-0033-010-01
TWP : BEDFORD
COUNTY : FRONTENAC

WATERSHED AREA	:	sq.km	SHORELINE	:	km.
SURFACE AREA	:	ha.	COTTAGES	:	
MAX DEPTH	:	m.	RESORTS	:	
VOLUME	:	mill cu. m.	% CROWN LAND	:	0

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/04/86	3.3	2.0
07/14/86	3.5	1.7
08/20/86	3.7	5.4
09/01/86	3.5	6.2
MEAN	3.5	3.8
MAX	3.7	6.2
MIN	3.3	1.7
N	4	4
SD	0.16	2.31

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 *	5.3	2.4
1981	3.9	3.1
1982	2.6	2.9
1983	2.2	2.8
1984	3.0	2.1
1985 **	2.8	5.1
1986 *	3.5	3.8
MEAN	3.3	3.1
MAX	5.3	5.1
MIN	2.2	2.1
N	7	7
SD	1.04	1.01

NOTE : * Based on less than 6 readings.
** Recreational lakes included.



LAKE : BOB'S LAKE : MUD BAY
TWP : BEDFORD
COUNTY : FRONTENAC

ID NUMBER : 18-0033-008-01

WATERSHED AREA	: 6.11	sq.km	SHORELINE	: 0.00 km.
SURFACE AREA	: 202.0	ha.	COTTAGES	: 150+15 HOUSES
MAX DEPTH	: 7.30	m.	RESORTS	: 4 (62)
VOLUME	: 6.40	mill cu. m.	% CROWN LAND	: 20

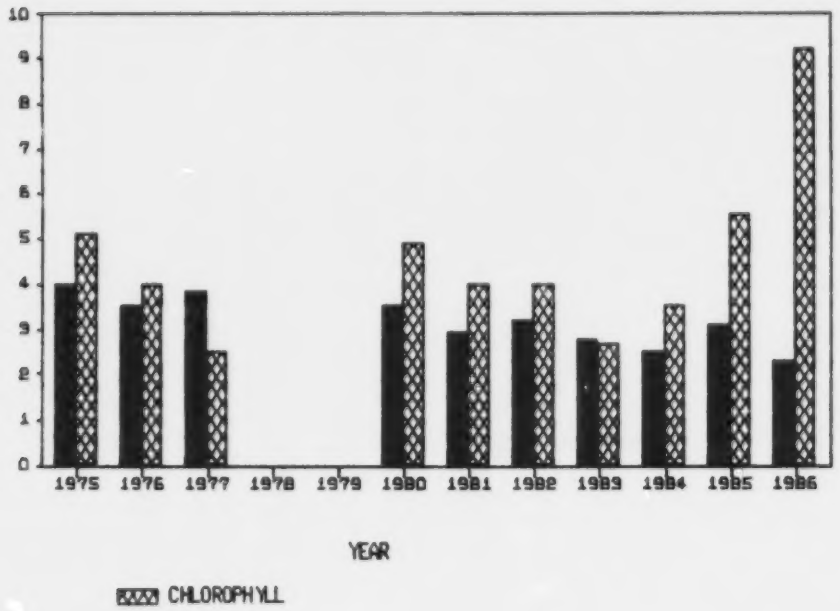
MUD BAY

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/16/86	2.7	2.4
06/30/86	2.7	6.0
07/14/86	3.3	5.3
07/28/86	2.9	10.6
08/12/86	1.5	15.0
08/18/86	1.5	11.3
08/28/86	2.3	7.2
09/10/86	2.1	14.5
10/02/86	1.8	15.5
10/24/86	2.9	5.1
MEAN	2.3	9.2
MAX	3.3	15.5
MIN	1.5	2.4
N	10	10
SD	0.63	4.72

MUD BAY

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	4.0	5.1
1976	3.5	4.0
1977	3.8	2.5
1980	3.5	4.9
1981	2.9	4.0
1982	3.2	4.0
1983	2.8	2.7
1984	2.5	3.5
1985	3.1	5.5
1986	2.3	9.2
MEAN	3.1	4.5
MAX	4.0	9.2
MIN	2.3	2.5
N	10	10
SD	0.55	1.90

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



LAC DU BOIS DUR

Insufficient sampling was carried out obtain any meaningful results. At least six sets of measurements are required to adequately characterize the water quality of a lake and preferably 12 or more sets of measurements evenly timed through out the ice free season from the beginning of May to the end of October to define any seasonal trends if they are present.

Increased sampling frequency is encouraged on Lac du Bois Dur during 1987 so that an assessment of water quality conditions in the lake will be possible.

LAKE : BOIS DUR, LAC DU - PETAWAWA RIVER ID NUMBER : 18-4930-002-01
TWP : PETAWAWA
COUNTY : RENFREW

WATERSHED AREA :				
SURFACE AREA	: 2.42	sq.km	SHORELINE	: 24.15 km.
MAX DEPTH	: 58.0	ha.	COTTAGES	: 22
VOLUME	: 10.85	m.	RESORTS	:
		mill cu. m.	% CROWN LAND	:

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
08/17/86	3.8	1.6

BOULTER LAKE

Nine sets of samples were collected from April 30 to July 9. Chlorophyll concentrations were higher during the summer than during the spring but the presence or absence of a fall peak cannot be confirmed.

Both the 1986 sampling results and those of previous years in the historical record table indicate that Boulter Lake has very good water quality.

LAKE : BOULTER LAKE
TWP : MCLURE
COUNTY : HASTINGS

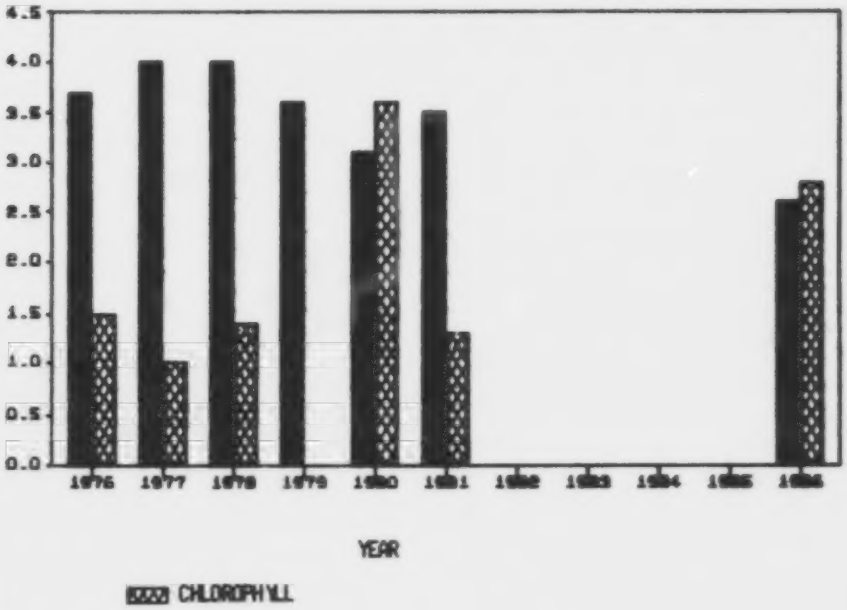
ID NUMBER : 18-3490-009-01

WATERSHED AREA	: 7.74	sq.km	SHORELINE	: 2.42 km.
SURFACE AREA	: 41	ha.	COTTAGES	: 25 (1971)
MAX DEPTH	: 22.87	m.	RESORTS	: 0 (1971)
VOLUME	: 4.16	mill cu. m.	% CROWN LAND	:

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
04/30/86	3.4	1.1
05/08/86	2.4	1.5
05/15/86	2.7	1.4
05/28/86	2.9	2.1
06/07/86	2.6	2.0
06/18/86	2.6	4.7
06/25/86	2.9	2.0
07/01/86	2.1	6.8
07/09/86	2.6	3.9
MEAN	2.6	2.8
MAX	3.4	6.8
MIN	2.1	1.1
N	9	9
SD	0.36	1.91

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1976	3.7	1.5
1977	4.0	1.0
1978	4.0	1.4
1980	3.1	3.6
1981 ‡	3.5	1.3
1986	2.6	2.8
MEAN	3.5	1.9
MAX	4.0	3.6
MIN	2.6	1.0
N	7	6
SD	0.50	1.03

NOTE : ‡ Based on less than 6 readings.
‡‡ Recreational lakes included.



BRULE (WENSLEY) LAKE

Twelve samples were collected from June 21 to September 25. There was no evidence of any pronounced seasonality in the results, although the presence or absence of a spring peak in chlorophyll concentrations cannot be confirmed.

Both the 1986 sampling results and those from previous years in the historical record table indicate that Brule Lake has excellent water quality. Very few lakes have greater Secchi disc visibility or less algae in the water.

LAKE : BRULE (WENSLEY) LAKE
TWP : MILLER
COUNTY : FRONTENAC

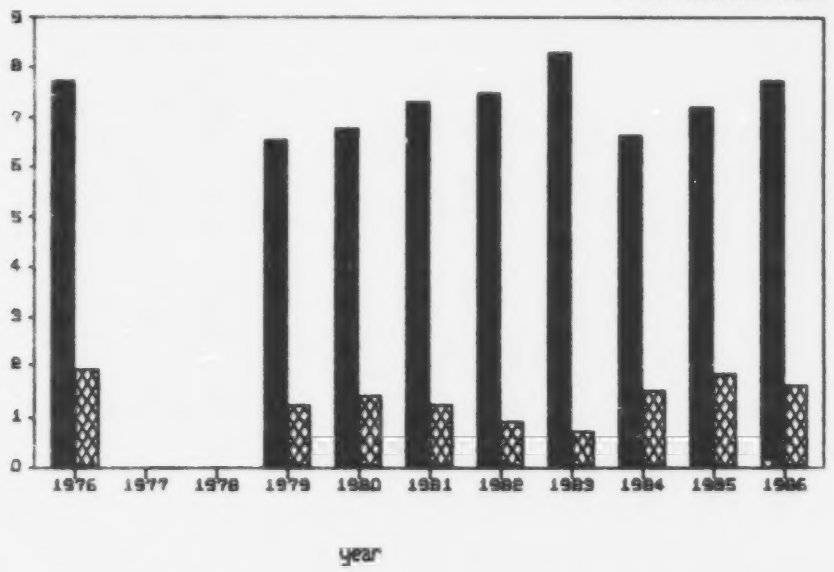
ID NUMBER : 18-3490-010-01

WATERSHED AREA	: 52.79	sq.km	SHORELINE	: 26.60	km.
SURFACE AREA	: 571.0	ha.	COTTAGES	: 85	
MAX DEPTH	: 56.40	m.	RESORTS	: 2(3)	
VOLUME	: 126.65	mill cu. m.	% CROWN LAND	: 35	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/21/86	7.6	
07/15/86	7.9	2.2
07/15/86	7.3	1.2
07/16/86	8.5	1.6
07/16/86	8.2	1.4
07/22/86	7.1	1.3
07/23/86	8.2	1.8
07/24/86	7.7	1.9
08/16/86	7.6	
08/16/86	7.9	
08/20/86	7.7	1.0
09/25/86	6.7	2.0
MEAN	7.7	1.6
MAX	8.5	2.2
MIN	6.7	1.0
N	12	9
SD	0.50	0.40

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1976 ‡‡	7.7	1.9
1979	6.5	1.2
1980	6.8	1.4
1981	7.3	1.2
1982	7.5	0.9
1983	8.3	0.7
1984	6.6	1.5
1985	7.2	1.8
1986	7.7	1.6
MEAN	7.2	1.3
MAX	8.3	1.9
MIN	6.5	0.7
N	9	9
SD	0.59	0.40

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



BUCK LAKE - NORTH BAY

An intensive sampling effort from April 19 to October 12 at the north end, encompassing virtually the entire growing season, reconfirmed the presence of a spring pulse and a fall peak in chlorophyll concentrations detected by the 1985 sampling program. The synchronous elevation of chlorophyll concentrations in the fall documented by sampling at the south end of North Bay indicate this pattern is a whole lake phenomenon. It is therefore more likely due to natural factors rather than to localized conditions around the lake.

Higher chlorophyll concentrations in 1985 and 1986 compared to the earlier record can be attributed to the enhanced recovery of chlorophyll by an improved analytical procedure introduced by the laboratory in 1985.

The seasonal mean Secchi disc visibility depth and chlorophyll concentration values indicate the North Bay of Buck Lake has good water quality. However, the seasonality in chlorophyll concentrations is atypical of deep oligotrophic lakes and may reflect a sensitivity to nutrients not accounted for in a conventional lake sensitivity analysis. Further study may be required to determine if development controls are needed for the protection of water quality in the North Bay.

Dr. A. M. Bryans accepted an awards plaque on behalf of the Buck Lake Protective Association in recognition of their 10 or more year record of particpation in the Self Help Program. The awards presentation was made at a Self Help Program banquet held in Kingston on September 19, 1986.

LAKE : BUCK LAKE : NORTH BAY — ID NUMBER : 12-0004-002-01
TWP : LOUGHBOROUGH, BEDFORD, STORRINGTON
COUNTY : FRONTENAC

WATERSHED AREA	: 19.16	sq.km	SHORELINE	: 15.00 km.
SURFACE AREA	: 276.0	ha.	COTTAGES	: 77 (1976)
MAX DEPTH	: 32.00	m.	RESORTS	: 1 (25)
VOLUME	: 27.78	mill cu. m.	% CROWN LAND	: 10

NORTH BAY - NORTH END

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
04/19/86	4.0	3.0
04/26/86	3.7	5.6
05/03/86	3.0	7.2
05/10/86	4.3	3.7
05/25/86	5.3	2.0
05/31/86	5.8	1.9
06/21/86	5.8	1.6
06/22/86	4.6	3.0
06/29/86	4.0	3.6
07/01/86	3.8	4.9
07/13/86	3.9	4.5
07/20/86	3.6	2.5
07/23/86	4.0	3.3
07/27/86	3.7	5.6
07/30/86	3.5	6.9
08/04/86	3.4	7.7
08/10/86	3.4	7.8
08/12/86	3.7	8.3
08/17/86	3.1	7.9
08/24/86	2.7	3.1
09/04/86	3.2	8.5
09/06/86	3.1	6.2
09/14/86	3.7	7.4
09/21/86	4.1	6.2
10/05/86	4.3	6.1
10/12/86	4.3	4.0
MEAN	3.9	5.1
MAX	5.8	8.5
MIN	2.7	1.6
N	26	26
SD	0.78	2.20

NORTH BAY - SOUTH END

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/15/86	4.3	2.6
06/22/86	4.4	2.6
07/06/86	3.3	4.0
07/20/86	3.5	3.5
07/27/86	3.7	4.9
08/04/86	3.1	6.7
08/10/86	2.7	7.9
08/17/86	3.1	6.8
09/01/86	3.4	7.6
10/12/86	4.0	2.7
MEAN	3.5	4.9
MAX	4.4	7.9
MIN	2.7	2.6
N	10	10
SD	0.55	2.14

LAKE : BUCK LAKE : NORTH BAY
TWP : LOUGHBOROUGH, BEDFORD, STORRINGTON
COUNTY : FRONTENAC

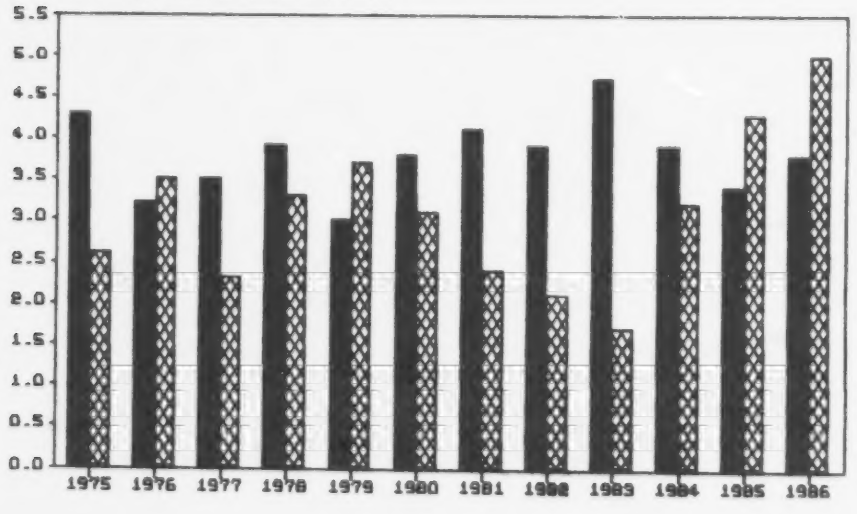
ID NUMBER : 12-0004-002-01

WATERSHED AREA	: 19.16	sq.km	SHORELINE	: 15.00 km.
SURFACE AREA	: 276.0	ha.	COTTAGES	: 77 (1976)
MAX DEPTH	: 32.00	m.	RESORTS	: 1 (25)
VOLUME	: 27.78	mill cu. m.	% CROWN LAND	: 10

NORTH AND SOUTH ENDS COMBINED

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	4.3	2.6
1976 ‡	3.2	3.5
1977	3.5	2.3
1978	3.9	3.3
1979 ‡‡	3.0	3.7
1980	3.8	3.1
1981	4.1	2.4
1982	3.9	2.1
1983	4.7	1.7
1984	3.9	3.2
1985	3.4	4.3
1986	3.8	5.0
MEAN	3.7	3.1
MAX	4.7	5.0
MIN	3.0	1.7
N	12	12
SD	0.47	0.95

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



BUCK LAKE - SOUTH BAY

The excellent sampling coverage provided by 19 sets of results from May 24 to October 13 did not reveal a seasonal pattern in water quality as detected in the North Bay. Chlorophyll concentrations as a consequence tended to be lower and water clarity better than in the North Bay. This has also been the case in 1975, 1978 and 1979 when sampling on both Bays was also carried out.

LAKE : BUCK LAKE : SOUTH BAY — ID NUMBER : 12-0004-004-01
TWP : LOUGHBOROUGH, BEDFORD, STORRINGTON
COUNTY : FRONTENAC

WATERSHED AREA	: 62.14	sq.km	SHORELINE	: 30.9	km.
SURFACE AREA	: 467.4	ha.	COTTAGES	: 181	(1976)
MAX DEPTH	: 39	m.	RESORTS	: 1	(4)
VOLUME	: 61.0	mill cu. m.	% CROWN LAND	: 0	

EAST SIDE

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/30/86	2.4	1.3
06/21/86	4.6	1.9
07/20/86	3.3	4.7
08/02/86	2.3	3.2
08/27/86	3.4	3.7
09/01/86		3.3
09/06/86	2.6	
MEAN	3.1	3.0
MAX	4.6	4.7
MIN	2.3	1.3
N	6	6
SD	0.87	1.23

NEAR PORCUPINE ISLAND

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/24/86	4.6	2.1
06/01/86		2.8
06/09/86	5.2	2.5
06/15/86	4.9	1.4
06/22/86	5.5	2.3
07/02/86	5.6	3.9
07/11/86	5.4	2.8
07/18/86	5.0	2.7
07/25/86	5.0	2.5
08/04/86	5.2	3.4
08/10/86	4.2	2.7
08/17/86	4.4	3.1
08/24/86	4.2	8.0
09/01/86	4.4	1.8
09/14/86	4.9	3.2
09/21/86	5.3	2.9
09/28/86	5.3	3.6
10/05/86	5.5	3.9
10/13/86	5.0	2.9
MEAN	4.9	3.0
MAX	5.6	8.0
MIN	4.2	1.4
N	18	19
SD	0.45	1.36

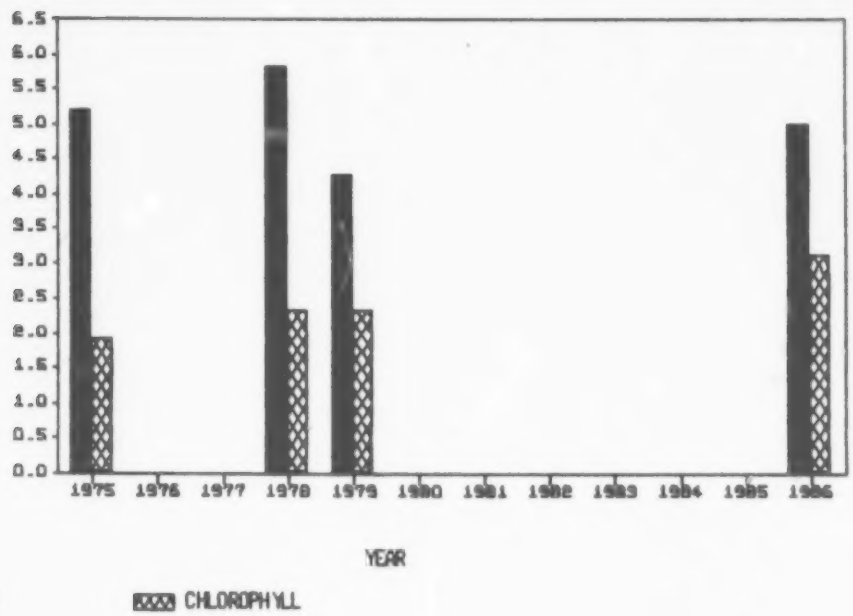
LAKE : BUCK LAKE : SOUTH BAY ID NUMBER : 12-0004-004-01
TWP : LOUGHBOROUGH, BEDFORD, STORRINGTON
COUNTY : FRONTENAC

WATERSHED AREA	: 62.14	sq.km	SHORELINE	: 30.9	km.
SURFACE AREA	: 467.4	ha.	COTTAGES	: 181 (1976)	
MAX DEPTH	: 39	m.	RESORTS	: 1(4)	
VOLUME	: 61.0	mill cu. m.	% CROWN LAND	: 0	

SOUTH BAY

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	4.3	2.6
1978	5.8	2.3
1979 ‡‡	4.3	2.3
1986	5.0	3.1
MEAN	4.8	2.5
MAX	5.8	3.1
MIN	4.3	2.3
N	4	4
SD	0.71	0.38

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



BURRIDGE LAKE

A comprehensive sampling program resulted in the collection of 16 samples from May 10 to October 24. An element of subjectivity in measuring Secchi disc visibility depths was introduced by a variety of different volunteers in carrying out the program on Burridge Lake. Even so, the pattern of high Secchi disc visibility followed by a decrease in water transparency replicates a pattern observed in Burridge Lake in 1985, 1984 and 1981. The seasonal decline in water transparency was accompanied by a generally increasing trend in chlorophyll concentrations as the season progressed.

Like other lakes during 1986, Burridge Lake experienced an increase in chlorophyll and a decline in water clarity compared to 1985 results. This pattern might be a result of the unusually wet weather that occurred during the summer. This decline in water clarity and the increase in chlorophyll concentration did not significantly affect water quality conditions in Burridge Lake which continue to be very good.

LAKE : BURRIDGE LAKE
TWP : BEDFORD
COUNTY : FRONTENAC

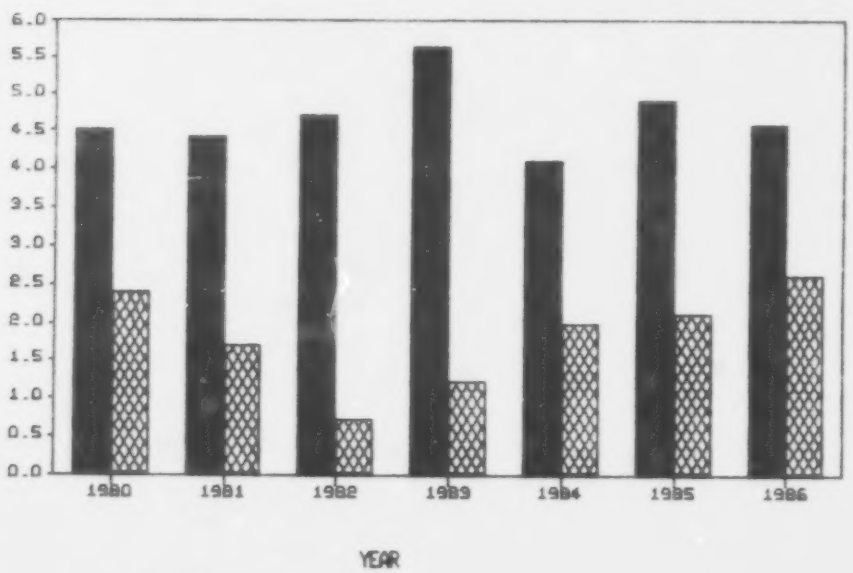
ID NUMBER : 18-0033-014-01

WATERSHED AREA	: 4.53	sq.km	SHORELINE	: 6.90	km.
SURFACE AREA	: 81.0	ha.	COTTAGES	: 47 (1974)	
MAX DEPTH	: 16.20	m.	RESORTS	:	
VOLUME	: 5.89	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/10/86	8.5	
05/25/86	6.4	1.2
06/08/86	3.8	1.7
06/15/86	4.6	
06/22/86	4.3	1.6
07/01/86		2.0
07/06/86	4.6	1.8
07/13/86	4.9	2.8
07/20/86	3.9	2.6
07/27/86	4.9	2.1
08/04/86	3.5	3.7
08/10/86	3.8	3.1
08/17/86	5.0	1.9
08/25/86	4.1	4.6
10/10/86	3.7	3.1
10/18/86	4.0	3.5
10/24/86	4.1	3.8
MEAN	4.6	2.6
MAX	8.5	4.6
MIN	3.5	1.2
N	16	15
SD	1.25	0.98

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1980	4.5	2.4
1981	4.4	1.7
1982	4.7	0.7
1983 ‡‡	5.6	1.2
1984	4.1	2.0
1985	4.9	2.1
1986	4.6	2.6
MEAN	4.6	1.8
MAX	5.6	2.6
MIN	4.1	0.7
N	7	7
SD	0.47	0.67

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



CHARLESTON LAKE

Good coverage was provided by a sampling program that produced 12 sets of results between June 2 and September 13 from each of three sampling locations. Results from the three locations are comparable indicating there is no marked localized variation in water quality among the three areas of the lake. Chlorophyll concentrations were higher in early June than throughout the rest of the summer. With the absence of spring sampling from the previous years that Charleston Lake has been sampled, it is not apparent whether this pattern is characteristic of the lake or not.

All three sampling locations experienced poorer water clarity and higher chlorophyll concentrations during 1986 than during 1985. This was the case for other lakes in the Self Help Program and might be the result of the unusually wet weather experienced during the summer.

The Secchi disc visibility depths and the chlorophyll concentrations indicate Charleston Lake has good water quality well suited for a variety of recreational pursuits including water oriented uses such as swimming.

The Charleston Lake Provincial Park was awarded a plaque at our Self Help banquet held in Kingston on September 19, 1986 in recognition of their 10 year record of participation in the Self Help Program. The Charleston Lake Ratepayers Association have also assisted with water sampling since 1978.

LAKE : CHARLESTON LAKE ID NUMBER : 12-0017-002-01
TWP : REAR OF LEEDS & LANSDOWNE, FRONT & REAR OF YONGE
COUNTY : LEEDS

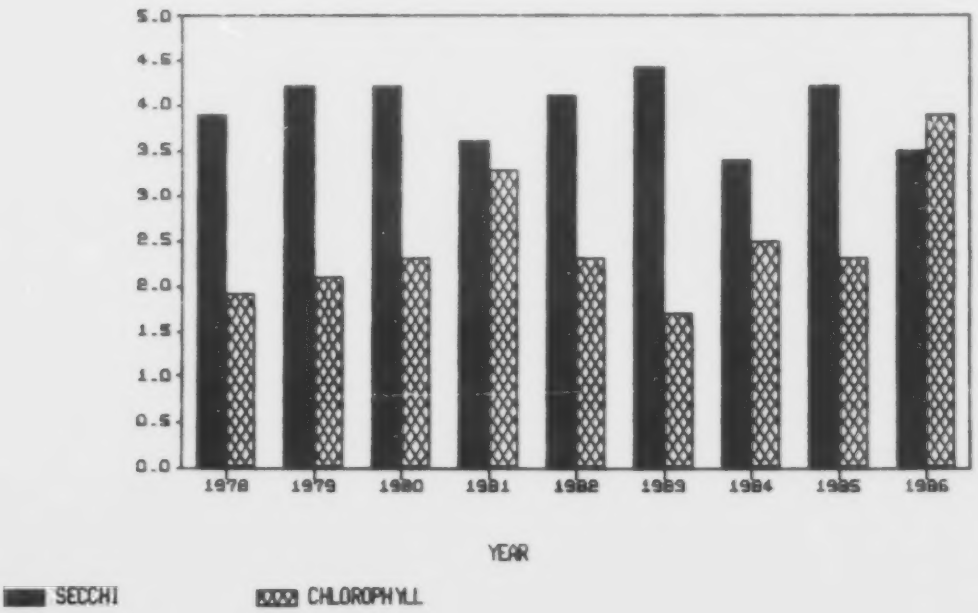
WATERSHED AREA	: 300.00	sq.km	SHORELINE	: 152.00km.
SURFACE AREA	: 2517.0	ha.	COTTAGES	: 627 +63 HOUSES
MAX DEPTH	: 91.00	m.	RESORTS	: 3(40)+(227) PR
VOLUME	: 437.00	mill cu. m.	% CROWN LAND	: 20

NEAR GOOSE ISLAND

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/02/86	2.7	7.0
06/09/86	3.4	5.4
06/23/86	3.4	2.0
06/30/86	3.7	5.3
07/07/86	3.5	4.0
07/20/86	2.9	4.5
07/28/86		4.4
08/11/86	3.7	3.6
08/18/86	3.5	2.9
08/25/86	3.8	3.2
09/02/86	4.0	2.4
09/13/86	4.4	2.9
MEAN	3.5	3.9
MAX	4.4	7.0
MIN	2.7	2.0
N	11	12
SD	0.47	1.44

NEAR GOOSE ISLAND

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1978	3.9	1.9
1979	4.2	2.1
1980	4.2	2.3
1981	3.6	3.3
1982	4.1	2.3
1983	4.4	1.7
1984	3.4	2.5
MEAN	3.9	2.4
MAX	4.4	3.9
MIN	3.4	1.7
N	9	9
SD	0.36	0.70



LAKE : CHARLESTON LAKE
TWP : REAR OF LEEDS & LANSDOWNE, FRONT & REAR OF YONGE
COUNTY : LEEDS

ID NUMBER : 12-0017-002-01

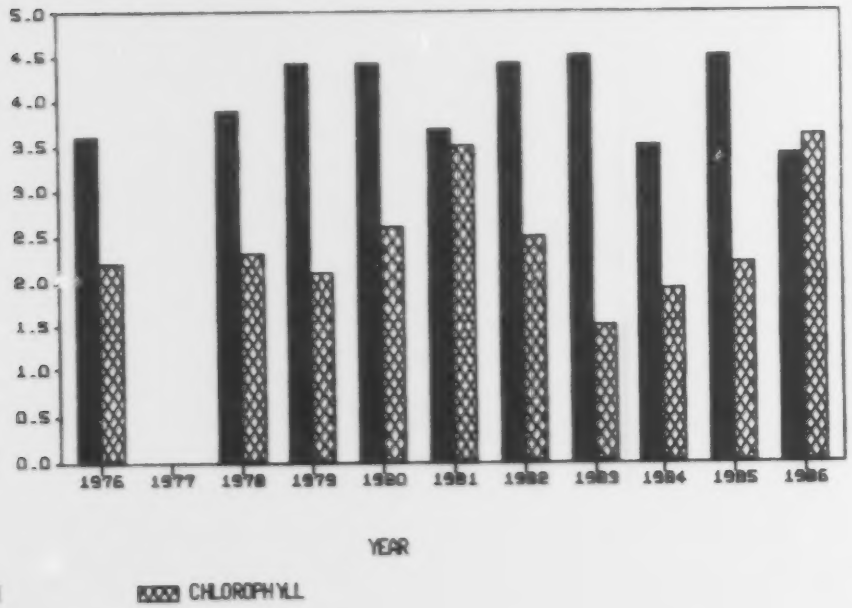
WATERSHED AREA	: 300.00	sq.km	SHORELINE	: 152.00km.
SURFACE AREA	: 2517.0	ha.	COTTAGES	: 627 +63 HOUSES
MAX DEPTH	: 91.00	m.	RESORTS	: 3(40)+(227) PR
VOLUME	: 437.00	mill cu. m.	% CROWN LAND	: 20

WEBSTER'S BAY

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/02/86	3.1	4.9
06/09/86	3.2	4.9
06/22/86	3.7	4.5
06/23/86	3.2	1.5
07/07/86	3.7	2.6
07/20/86	3.0	4.7
07/28/86		4.2
08/11/86	3.5	3.7
08/18/86	3.1	3.3
08/25/86	4.1	3.9
09/02/86	3.7	2.6
09/13/86	3.1	3.3
MEAN	3.4	3.6
MAX	4.1	4.9
MIN	3.0	1.5
N	11	12
SD	0.36	1.06

WEBSTER'S BAY

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1976	3.6	2.2
1978	3.9	2.3
1979	4.4	2.1
1980	4.4	2.6
1981	3.7	3.5
1982	4.4	2.5
1983	4.5	1.5
1984	3.5	1.9
1985	4.5	2.2
1986	3.4	3.6
MEAN	4.0	2.4
MAX	4.5	3.6
MIN	3.4	1.5
N	10	10
SD	0.45	0.66



LAKE : CHARLESTON LAKE ID NUMBER : 12-0017-002-01
TWP : REAR OF LEEDS & LANSDOWNE, FRONT & REAR OF YONGE
COUNTY : LEEDS

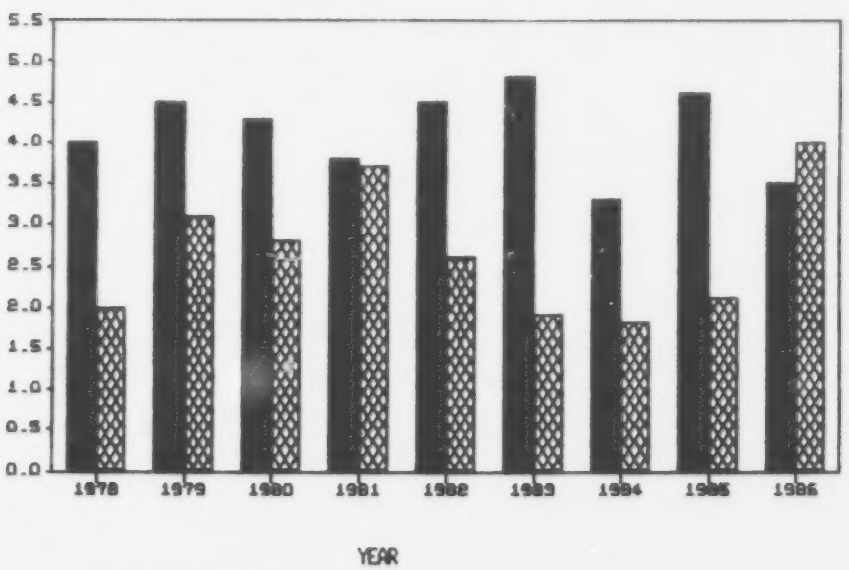
WATERSHED AREA	: 300.00	sq.km	SHORELINE	:	152.00km.
SURFACE AREA	: 2517.0	ha.	COTTAGES	:	627 +63 HOUSES
MAX DEPTH	: 91.00	m.	RESORTS	:	3(40)+(227) PR
VOLUME	: 437.00	mill cu. m.	% CROWN LAND	:	20

WESTERN WATER

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/02/86	3.1	5.3
06/09/86	3.4	5.0
06/22/86	4.6	5.0
06/23/86	3.2	2.7
07/07/86	3.9	2.9
07/20/86	3.2	5.0
07/28/86		5.2
08/11/86	3.4	4.5
08/18/86	3.2	2.8
08/25/86	3.5	4.5
09/02/86	3.4	2.5
09/13/86	4.3	3.1
MEAN	3.5	4.0
MAX	4.6	5.3
MIN	3.1	2.5
N	11	12
SD	0.49	1.13

WESTERN WATER

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1978	4.0	2.0
1979	4.5	3.1
1980	4.3	2.8
1981	3.8	3.7
1982	4.5	2.6
1983	4.8	1.9
1984	3.3	1.8
1985	4.6	2.1
1986	3.5	4.0
MEAN	4.1	2.6
MAX	4.8	4.0
MIN	3.3	1.8
N	9	9
SD	0.52	0.80



CHIPPEGO LAKE

An excellent program was carried out with 14 samples taken from April 17 to November 11. The lake is moderately productive but water clarity is good. Higher chlorophyll concentrations in 1985 and 1986 can be explained by an improvement in the analytical procedure for chlorophyll introduced by the laboratory in 1985. Water clarity has not changed since the Self Help Program was initiated on Chippego Lake in 1979.

LAKE : CHIPPEGO LAKE
TWP : HINCHINBROOKE
COUNTY : FRONTENAC

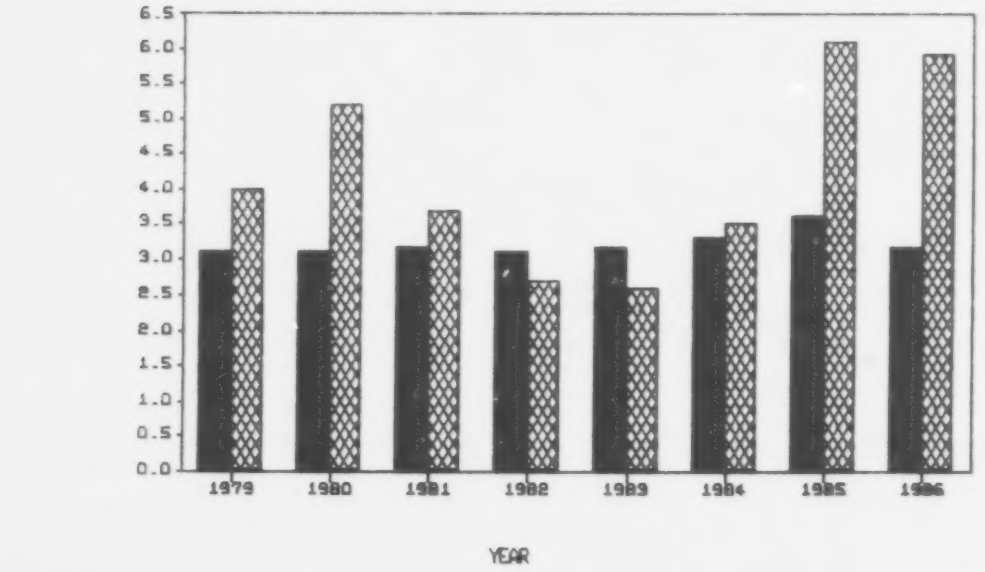
ID NUMBER : 17-0035-002-01

WATERSHED AREA	: 11.90	sq.km	SHORELINE	: 7.90	km.
SURFACE AREA	: 103.0	ha.	COTTAGES	: 57 (1983)	
MAX DEPTH	: 8.30	m.	RESORTS	: 1	
VOLUME	: 6.85	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
04/27/86	3.4	9.1
05/21/86	3.5	
06/04/86	3.2	6.7
06/22/86	3.2	7.7
07/02/86	3.5	9.1
07/23/86	3.5	5.5
08/14/86	3.2	3.7
08/27/86	3.2	6.8
09/02/86	3.1	4.4
09/17/86	2.9	5.3
10/10/86	3.1	5.2
10/19/86	3.1	4.0
10/30/86	3.5	4.3
11/11/86	2.9	
MEAN	3.2	5.9
MAX	3.5	9.1
MIN	2.9	3.7
N	14	12
SD	0.21	1.89

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1979	3.1	4.0
1980	3.1	5.2
1981	3.2	3.7
1982	3.1	2.7
1983 ‡‡	3.2	2.6
1984	3.3	3.5
1985	3.6	6.1
1986	3.2	5.9
MEAN	3.2	4.2
MAX	3.6	6.1
MIN	3.1	2.6
N	8	8
SD	0.17	1.37

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



CHRISTIE LAKE

A good sampling program was carried out with 12 samples collected from April 5 to September 28. The results show gradually increasing chlorophyll concentrations throughout the season. The rising chlorophyll concentrations were accompanied by declining Secchi disc visibility depths. This has been fairly typical of Christie Lake for a number of years. Water quality conditions are generally good with acceptable chlorophyll concentrations and suitable water clarity.

The historical record indicates little change in water since 1975. Higher chlorophyll concentrations in 1985 and 1986 can be explained by better recovery of chlorophyll from lake samples by an improvement in the analytical procedure for the detection of chlorophyll introduced by the laboratory in 1985. The exceptionally high Secchi disc visibility depth of 7.6 metres and the extremely low chlorophyll concentration of 0.5 ug/L appear as an anomaly in the context of the rest of the historical record and may never again be replicated.

Cottagers on Christie Lake reported a die off of clams that persisted throughout most of the summer. Analysis of specimens collected by the Ministry of the Environment did not reveal the cause of the mortality. Further study may be warranted during 1987 if this problem recurs.

Some shoreline plantings were carried out on Christie Lake as a follow up to the Shoreland Restoration Program. The Shoreland Restoration Program was initiated on Christie Lake by the Ministry of Natural Resources and the Christie Lake Association as a pilot project in Ontario in 1984.

Mr. R. J. Oliver accepted an awards plaque from the Ministry of the Environment on behalf of the Christie Lake Association for their 10 year record of participation in the Cottagers' Self Help Program.

LAKE : CHRISTIE LAKE
TWP : SHERBROOKE, BATHURST
COUNTY : LANARK

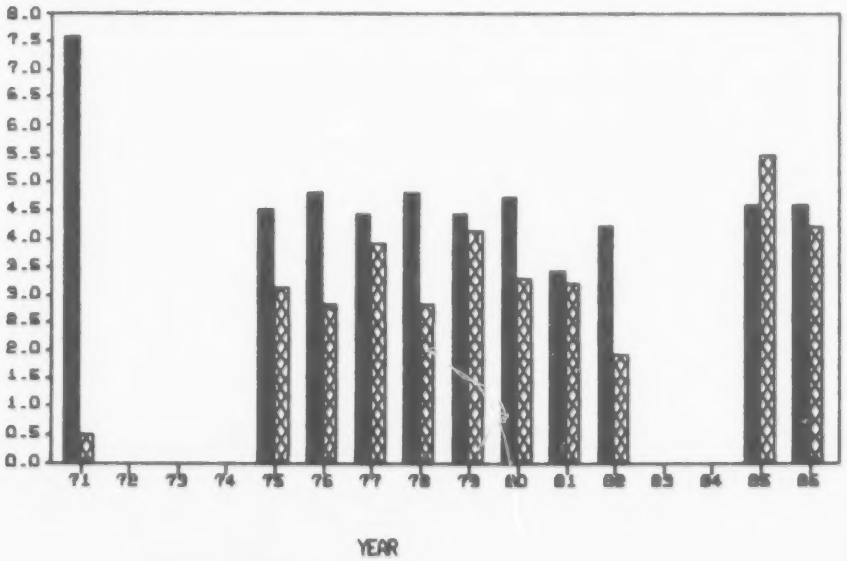
ID NUMBER : 18-0033-015-01

WATERSHED AREA	: 416	sq.km	SHORELINE	: 27.4	km.
SURFACE AREA	: 646	ha.	COTTAGES	: 265	
MAX DEPTH	: 18.3	m.	RESORTS	: 5 (20)	
VOLUME	: 55.17	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/18/86	6.1	
05/31/86	5.8	3.8
06/15/86	5.5	1.6
06/21/86	6.1	2.1
06/29/86	5.8	2.3
07/13/86	3.9	3.2
07/19/86	4.5	3.5
08/09/86	4.0	4.7
08/16/86	4.6	2.5
08/24/86	4.0	5.4
09/20/86	2.7	5.9
09/28/86	2.7	11.3
MEAN	4.6	4.2
MAX	6.1	11.3
MIN	2.7	1.6
N	12	11
SD	1.23	2.73

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1971	7.6	0.5
1975 ‡‡	4.5	3.1
1976	4.8	2.8
1977	4.4	3.9
1978	4.8	2.8
1979	4.4	4.1
1980	4.7	3.3
1981	3.4	3.2
1982	4.2	1.9
1985	4.6	5.5
1986	4.6	4.2
MEAN	4.7	3.2
MAX	7.6	5.5
MIN	3.4	0.5
N	11	11
SD	1.03	1.30

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



CROSBY LAKE

A sampling program was carried out from April 19 to September 1. During 1986, chlorophyll concentrations tended to rise while Secchi disc visibility depth declined over the season. Sampling results from previous years show that peaks in chlorophyll concentrations can occur at any time in Crosby Lake and do not necessarily conform to any predictable seasonal pattern.

Higher chlorophyll concentrations in 1985 and 1986 relate to an improvement in the analytical procedure for the recovery and detection of chlorophyll introduced by the laboratory in 1985.

An increase in chlorophyll concentrations and a decline in water clarity observed in Crosby Lake from 1985 to 1986 is a pattern observed in other lakes and might be due to the unusually wet weather experienced during the summer.

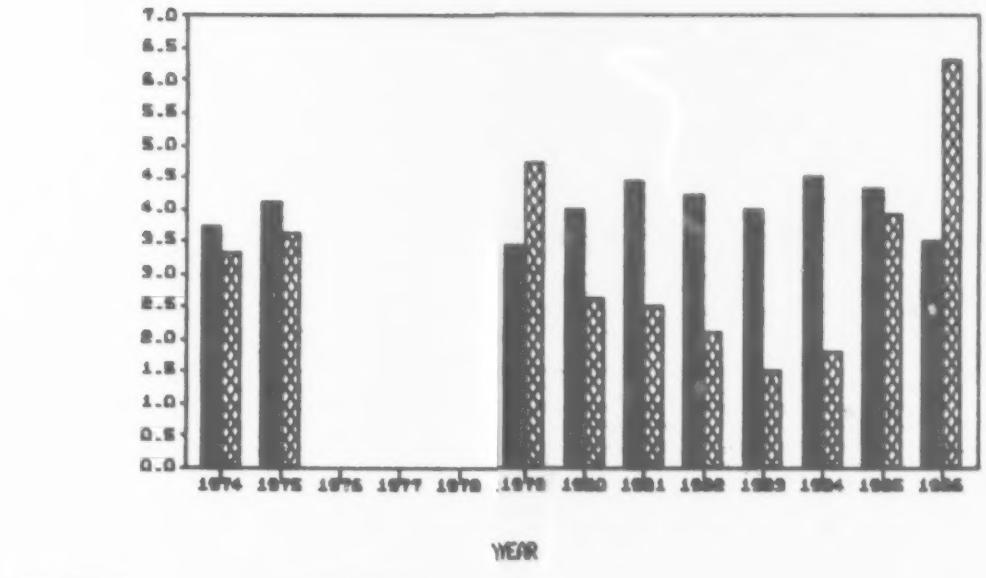
LAKE : CROSBY (BIG CROSBY) LAKE ID NUMBER : 18-0033-016-01
TWP : NORTH CROSBY
COUNTY : LEEDS

WATERSHED AREA	: 26.60	sq.km	
SURFACE AREA	: 263.0	ha.	
MAX DEPTH	: 19.00	m.	
VOLUME	: 21.68	mill cu. m.	
SHORELINE	: 17.70 km.		
COTTAGES	: 158 (1974)		
RESORTS	: 0		
% CROWN LAND	: 0		

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
04/19/86	3.4	2.1
05/25/86	4.9	
06/08/86	4.0	
07/13/86	3.9	2.6
07/27/86	3.3	3.6
08/04/86	3.4	5.3
08/10/86	3.1	8.7
08/24/86	2.4	12.6
09/01/86	3.1	9.8
MEAN	3.5	6.3
MAX	4.9	12.6
MIN	2.4	2.1
N	9	7
SD	0.70	4.03

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1974 ‡‡	3.7	3.3
1975 ‡‡	4.1	3.6
1979 ‡	3.4	4.7
1980	4.0	2.6
1981	4.4	2.5
1982	4.2	2.1
1983	4.0	1.5
1984	4.5	1.8
1985	4.3	3.9
1986	3.5	6.3
MEAN	4.0	3.2
MAX	4.5	6.3
MIN	3.4	1.5
N	10	10
SD	0.37	1.47

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



CROW LAKE

The 1986 results indicate there is very little seasonal variability in water clarity or chlorophyll concentrations in Crow Lake, however, the presence or absence of a spring peak in productivity cannot be confirmed without sampling in May or June.

The 1986 results and the historical record indicate that Crow Lake has excellent water quality.

LAKE : CROW LAKE
TWP : OSO, BEDFORD
COUNTY : FRONTENAC

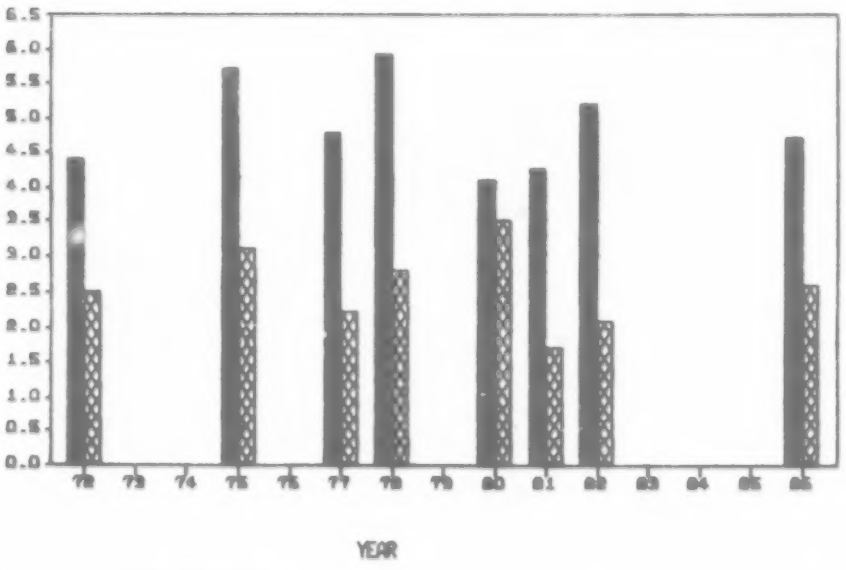
ID NUMBER : 18-0033-017-01

WATERSHED AREA	: 49 sq.km	SHORELINE	: 17 km.
SURFACE AREA	: 436 ha.	COTTAGES	: 95 (1972)
MAX DEPTH	: 38 m.	RESORTS	: 7 (53)
VOLUME	: 63.38 mill cu. m.	% CROWN LAND	: 5

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/07/86	5.2	3.1
07/17/86	4.9	2.2
07/22/86	4.9	2.4
07/30/86	4.6	3.0
08/08/86	4.9	2.9
08/15/86	4.6	2.1
08/20/86	4.9	2.4
09/01/86	4.0	2.8
MEAN	4.7	2.6
MAX	5.2	3.1
MIN	4.0	2.1
N	8	8
SD	0.36	0.38

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1972 ‡‡	4.4	2.5
1975 ‡‡	5.7	3.1
1977	4.8	2.2
1978 ‡	5.9	2.8
1980 ‡	4.1	3.5
1981 ‡‡	4.3	1.7
1982	5.2	2.1
1986	4.7	2.6
MEAN	4.8	2.5
MAX	5.9	3.5
MIN	4.1	1.7
N	8	8
SD	0.66	0.58

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



CROWE LAKE

The 1986 results show that chlorophyll concentrations were higher during August than either July or September but the presence or absence of a spring peak cannot be confirmed.

An apparent decline in water clarity from 1977 to 1978 is probably a result of a subjective difference in the interpretation Secchi disc visibility depth between participants when sampling changed hands.

The increase in chlorophyll concentration since 1985 can be explained only in part by an improvement in the analytical procedure for the recovery and detection of chlorophyll introduced by the laboratory in 1985.

LAKE : CROWE LAKE
TWP : MARMORA
COUNTY : HASTINGS

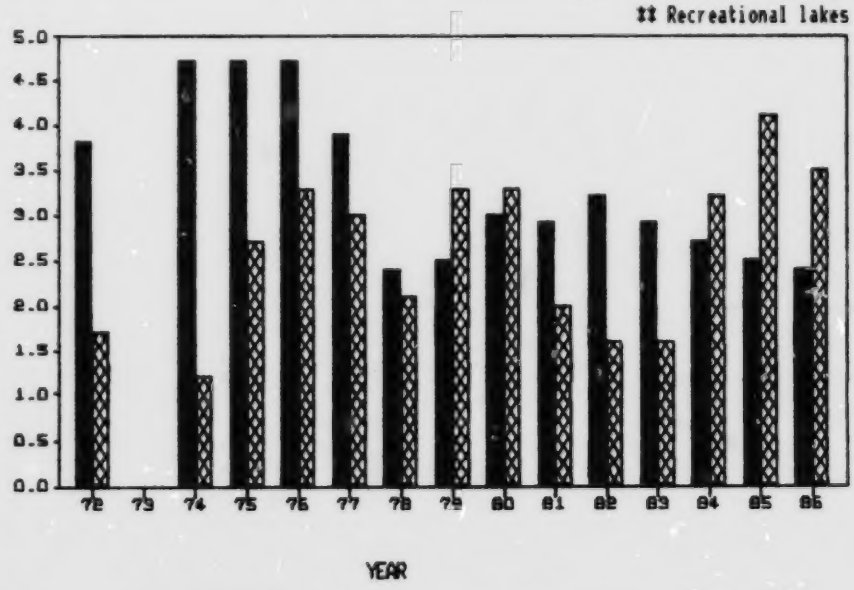
ID NUMBER : 17-0021-003-01

WATERSHED AREA	: 1444.00	sq.km	SHORELINE	: 21.00	km.
SURFACE AREA	: 876.0	ha.	COTTAGES	: 328	
MAX DEPTH	: 15.80	m.	RESORTS	: 6 (548)	
VOLUME	: 49.38	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/13/86	2.4	2.0
07/20/86	3.1	3.2
07/26/86	2.4	1.2
08/04/86	2.7	4.3
08/10/86	2.1	5.6
08/26/86	2.4	4.4
09/01/86	2.1	4.2
09/21/86	2.7	3.3
MEAN	2.4	3.5
MAX	3.1	5.6
MIN	2.1	1.2
N	8	8
SD	0.34	1.41

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1972 ‡‡	3.8	1.7
1974	4.7	1.2
1975 ‡	4.7	2.7
1976	4.7	3.3
1977 ‡	3.9	3.0
1978	2.4	2.1
1979	2.5	3.3
1980	3.0	3.3
1981	2.9	2.0
1982	3.2	1.6
1983	2.9	1.6
1984 ‡	2.7	3.2
1985	2.5	4.1
1986	2.4	3.5
MEAN	3.3	2.6
MAX	4.7	4.1
MIN	2.4	1.2
N	14	14
SD	0.88	0.90

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



DALHOUSIE LAKE

Twelve samples were collected from July 2 to September 15. Chlorophyll concentrations were quite variable but did not show any evidence of seasonality. However, the presence or absence of a spring peak in productivity cannot be confirmed without the benefit of sampling in May and June.

The 1986 results appear to indicate a deterioration in water quality relative to the period from 1975 to 1983. (Dalhousie Lake was not sampled in 1984 or 1985). An improvement in the laboratory procedure for the analysis of chlorophyll and the unusually wet weather experienced last summer might be responsible for this change. A decline in water clarity and an increase in chlorophyll concentrations was seen in other lakes in the program during 1986.

While the measured chlorophyll concentrations are higher and Secchi disc visibility depths lower than established by the previous sampling record, the water quality of Dalhousie Lake is good and capable of supporting a wide range of recreational pursuits including water contact uses such as swimming and bathing.

LAKE : DALHOUSIE LAKE
TWP : DALHOUSIE
COUNTY : LANARK

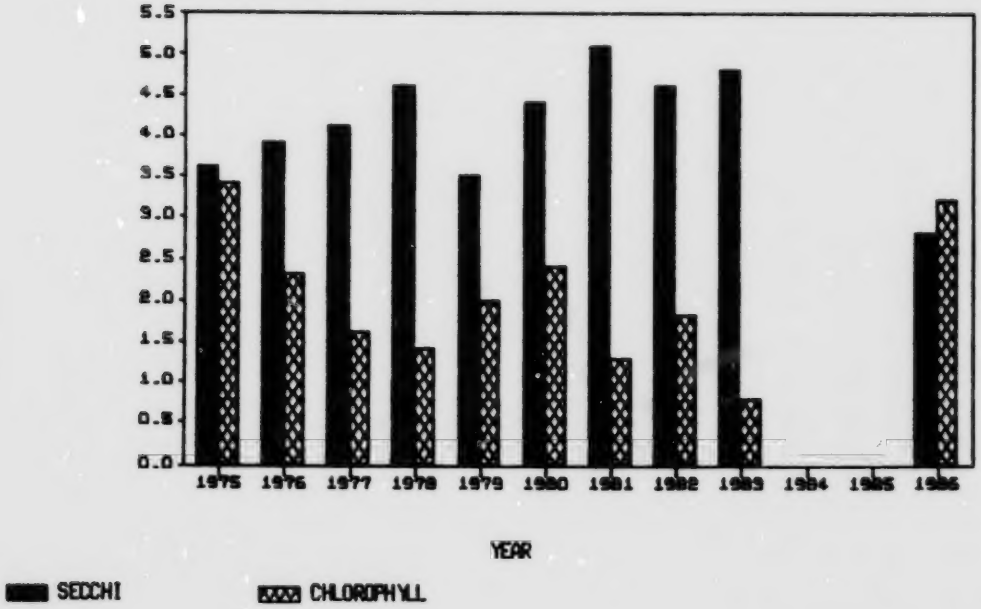
ID NUMBER : 18-3430-009-01

WATERSHED AREA	: 1288.00	sq.km	SHORELINE	: 13.50	km.
SURFACE AREA	: 591.0	ha.	COTTAGES	: 184 + 8	HOUSES
MAX DEPTH	: 13.41	m.	RESORTS	: 4 (73)	
VOLUME	: 43.22	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/02/86	3.0	3.8
07/07/86	2.7	2.9
07/14/86	3.2	2.8
07/21/86	3.1	7.3
07/28/86	2.7	1.8
08/04/86	2.2	3.3
08/11/86	2.9	2.5
08/17/86	2.7	1.5
08/26/86	2.7	2.5
09/01/86	3.1	2.6
09/09/86	2.4	3.7
09/15/86	3.1	4.8
MEAN	2.8	3.2
MAX	3.2	7.3
MIN	2.2	1.5
N	12	12
SD	0.31	1.55

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	3.6	3.4
1976	3.9	2.3
1977	4.1	1.6
1978	4.6	1.4
1979	3.5	2.0
1980 ‡‡	4.4	2.4
1981	5.1	1.3
1982	4.6	1.8
1983 ‡	4.8	0.8
1986	2.8	3.2
MEAN	4.1	2.0
MAX	5.1	3.4
MIN	2.8	0.8
N	10	10
SD	0.70	0.83

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



DAVERN LAKE

Twelve samples collected between mid June and mid September provided good seasonal coverage. There was no evidence of seasonality in the results.

There was a slight increase in chlorophyll concentration and a correspondingly minor decline in water clarity from 1985. This was a pattern observed in many lakes during 1986 and may be due to the unusually wet weather experienced during the summer.

The 1986 data and the long term historical average record indicate Davern Lake has excellent water quality with well above average water clarity.

LAKE : DAVERN LAKE
TWP : SOUTH SHERBROOKE
COUNTY : LANARK

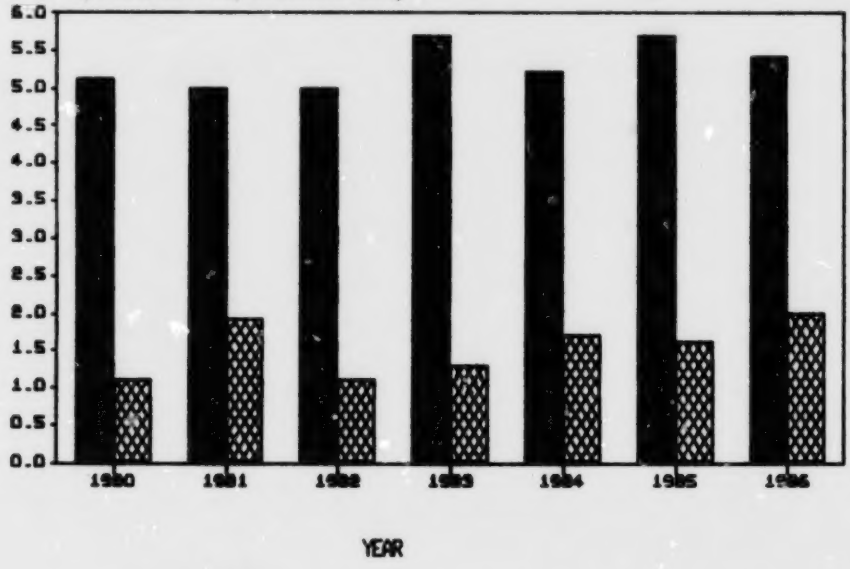
ID NUMBER : 18-0033-033-01

WATERSHED AREA	: 2.40	sq.km	SHORELINE	: 4.10	km.
SURFACE AREA	: 52.0	ha.	COTTAGES	: 17	
MAX DEPTH	: 25.10	m.	RESORTS	: 1 (15)	
VOLUME	: 6.01	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/15/86	6.7	1.4
06/30/86	6.1	2.5
07/06/86	5.2	1.8
07/20/86	5.2	2.0
07/27/86	5.8	1.9
08/04/86	5.5	2.0
08/10/86	4.9	3.1
08/17/86	4.9	1.6
09/01/86	4.9	1.3
09/07/86	4.9	2.6
09/14/86	5.5	2.1
09/17/86	5.5	1.8
MEAN	5.4	2.0
MAX	6.7	3.1
MIN	4.9	1.3
N	12	12
SD	0.56	0.52

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1980 ‡‡	5.1	1.1
1981 ‡‡	5.0	1.9
1982	5.0	1.1
1983	5.7	1.3
1984	5.2	1.7
1985	5.7	1.6
1986	5.4	2.0
MEAN	5.3	1.5
MAX	5.7	2.0
MIN	5.0	1.1
N	7	7
SD	0.31	0.37

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



DESERT LAKE

A total of 12 samples collected from Deyos Bay and 11 samples collected from South Bay between May 25 and October 5 provided excellent seasonal coverage of water quality conditions in Desert Lake.

Chlorophyll concentrations were demonstrably higher during the month of August than at other times of the year. This stands in sharp contrast to the pattern observed in 1985 when chlorophyll concentrations were higher in the spring and fall than during the summer. The results for 1986 also differ in that Desert Lake was one of a few lakes in the 1986 program that did not experience an increase in chlorophyll concentrations and a decline in water clarity relative to 1985 conditions.

An improvement in water clarity for 1986 reverses a trend of declining Secchi disc visibility depth since 1983.

Higher chlorophyll concentrations for 1985 and 1986 compared to the long term historical record can be attributed to an improvement to the analytical procedure for the recovery and detection of chlorophyll introduced by the laboratory in 1985.

The Secchi disc visibility depths and chlorophyll concentrations indicate that Desert Lake has exceptionally good water quality with no evidence of any deterioration over the period of record.

An awards plaque was presented to Mr. R. H. Horwood by the Ministry of the Environment at a Self Help Program banquet held in Kingston on September 19, 1986. The award was presented in recognition of the 10 year of record of sampling by the Desert Lake Property Owners Association.

LAKE : DESERT LAKE
TWP : BEDFORD, LOUGHBOROUGH
COUNTY : FRONTENAC

ID NUMBER : 12-0004-009-01

WATERSHED AREA	: 97.00	sq.km	SHORELINE	: 28.00	km.
SURFACE AREA	: 382.0	ha.	COTTAGES	: 71 (1976)	
MAX DEPTH	: 68.00	m.	RESORTS	: 3 (95)	
VOLUME	: 85.50	mill cu. m.	% CROWN LAND	: 0	

DEYOS BAY

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/25/86	4.6	1.8
06/15/86	4.6	2.6
07/09/86	4.6	2.8
07/17/86	4.9	3.4
08/04/86	4.6	3.9
08/10/86	4.0	3.6
08/17/86	4.6	3.2
08/24/86	4.0	3.7
09/07/86	4.3	2.1
09/14/86	4.9	
09/21/86	5.2	2.1
10/05/86	4.6	2.9
MEAN	4.5	2.9
MAX	5.2	3.9
MIN	4.0	1.8
N	12	11
SD	0.35	0.71

SOUTH BAY

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/25/86	4.6	1.9
06/15/86	4.6	2.9
07/17/86	4.3	2.5
08/04/86	4.3	3.9
08/10/86	4.0	3.5
08/17/86	4.6	3.2
08/24/86	3.7	3.5
09/07/86	4.0	2.2
09/14/86	4.9	2.7
09/21/86	5.2	2.4
10/05/86	4.3	3.5
MEAN	4.4	2.9
MAX	5.2	3.9
MIN	3.7	1.9
N	11	11
SD	0.43	0.64

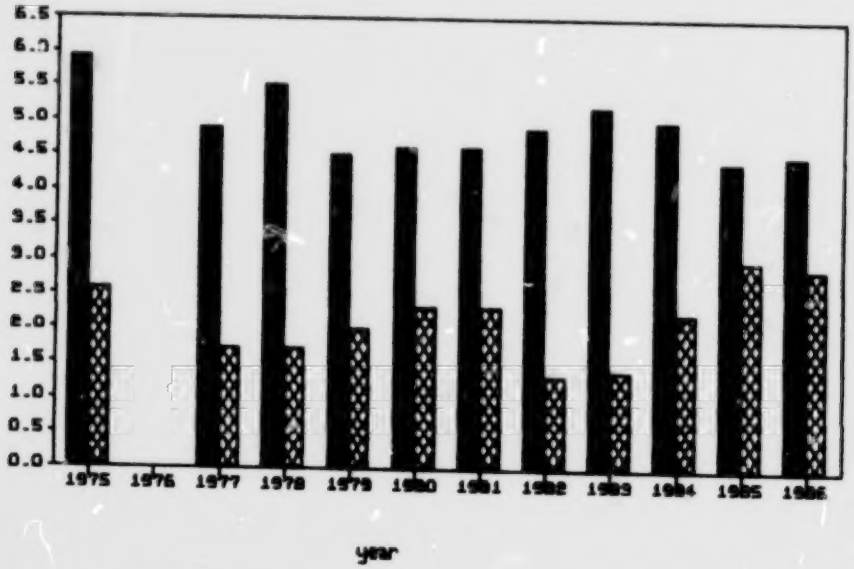
LAKE : DESERT LAKE
TWP : BEDFORD, LOUGHBOROUGH
COUNTY : FRONTENAC

ID NUMBER : 12-0004-009-01

WATERSHED AREA	: 97.00	sq.km	SHORELINE	: 28.00 km.
SURFACE AREA	: 382.0	ha.	COTTAGES	: 71 (1976)
MAX DEPTH	: 68.00	m.	RESORTS	: 3 (95)
VOLUME	: 85.50	mill cu. m.	% CROWN LAND	: 0

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	5.9	2.6
1977	4.9	1.7
1978	5.5	1.7
1979	4.5	2.0
1980	4.6	2.3
1981	4.6	2.3
1982	4.9	1.3
1983	5.2	1.4
1984	5.0	2.2
1985	4.4	3.0
1986	4.5	2.9
MEAN	4.9	2.1
MAX	5.9	3.0
MIN	4.4	1.3
N	11	11
SD	0.47	0.57

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



DEMPSEYS (VIRGIN) LAKE

Seven samples collected from June 11 to October 20 revealed a pattern of rising chlorophyll concentrations and declining Secchi disc visibility depths as the season progressed. Results for 1983, 1984 and 1985 are somewhat suggestive of this pattern but too few samples were collected in any of those years to define a seasonal trend in lake productivity.

Although there were too few samples to draw any definite conclusions about the presence of a seasonal trend in productivity in Dempseys Lake, the results clearly indicate that Dempseys Lake has excellent water quality with an extremely low level of algal productivity.

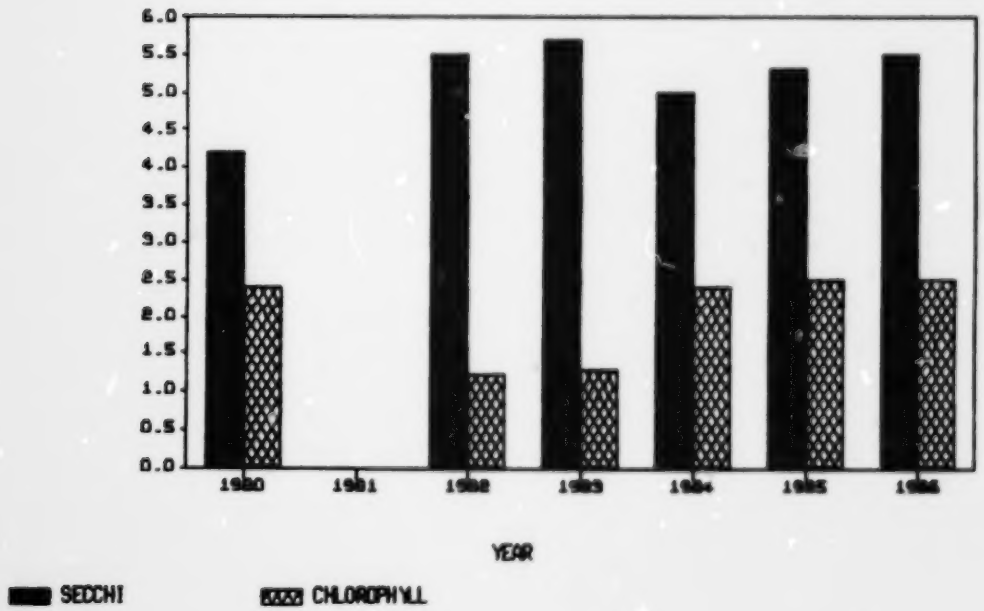
LAKE : DEMPSEYS (VIRGIN) LAKE
TWP : BAGOT, BLYTHFIELD
COUNTY : RENFREW

ID NUMBER : 18-3490-014-01

WATERSHED AREA	: 13.80	sq.km	SHORELINE	:	km.
SURFACE AREA	: 46.0	ha.	COTTAGES	:	
MAX DEPTH	:	m.	RESORTS	:	
VOLUME	:	mill cu. m.	% CROWN LAND	: 35	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/11/86	6.1	1.0
07/02/86	5.9	2.7
07/14/86	6.6	2.4
08/19/86	5.0	2.8
09/09/86	5.2	2.5
10/15/86	4.7	3.0
10/28/86	5.0	3.4
MEAN	5.5	2.5
MAX	6.6	3.4
MIN	4.7	1.0
N	7	7
SD	0.70	0.76

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1980	4.2	2.4
1982	5.5	1.2
1983	5.7	1.3
1984	5.0	2.4
1985	5.3	2.5
1986	5.5	2.5
MEAN	5.2	2.0
MAX	5.7	2.5
MIN	4.2	1.2
N	6	6
SD	0.54	0.62



DEVIL LAKE

Good seasonal coverage was provided by a total of eight samples collected from May 25 to September 1 from each of Buce Bay and Hays Bay. There was no evidence of any marked seasonal variability in either chlorophyll concentrations or Secchi disc visibility.

Higher chlorophyll concentrations during 1985 and 1986 compared to the earlier record can be explained by an improvement to the analytical procedure for chlorophyll introduced by the laboratory in 1985 that increased the recovery of chlorophyll from lake water samples.

The results from the Self Help Program clearly demonstrate that Devil Lake has excellent water quality with no evidence of any deterioration over the period of record.

LAKE : DEVIL LAKE
TWP : BEDFORD
COUNTY : FRONTENAC

ID NUMBER : 12-0004-010-01

WATERSHED AREA	: 174.00	sq.km	SHORELINE	: 36.20	km.
SURFACE AREA	: 1061.0	ha.	COTTAGES	: 220 + 3	HOUSES
MAX DEPTH	: 45.00	m.	RESORTS	: 4 (51)	
VOLUME	: 152.39	mill cu. m.	% CROWN LAND	: 20	

BUCE BAY

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/25/86	4.9	2.7
06/08/86	5.5	2.7
06/19/86	5.6	2.1
07/06/86	5.5	1.9
07/28/86	5.3	1.8
08/04/86	5.5	2.7
08/17/86	5.5	2.2
09/01/86	4.9	2.1
MEAN	5.3	2.2
MAX	5.6	2.7
MIN	4.9	1.8
N	8	8
SD	0.28	0.37

HAYS BAY

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/25/86	4.6	2.3
06/08/86	5.2	2.6
06/19/86	5.5	2.5
07/06/86	5.3	2.5
07/27/86	5.2	2.2
08/04/86	5.2	2.5
08/17/86	5.5	2.3
09/01/86	4.6	2.5
MEAN	5.3	2.4
MAX	5.5	2.6
MIN	4.6	2.2
N	8	8
SD	0.35	0.14

LAKE : DEVIL LAKE
TWP : BEDFORD
COUNTY : FRONTENAC

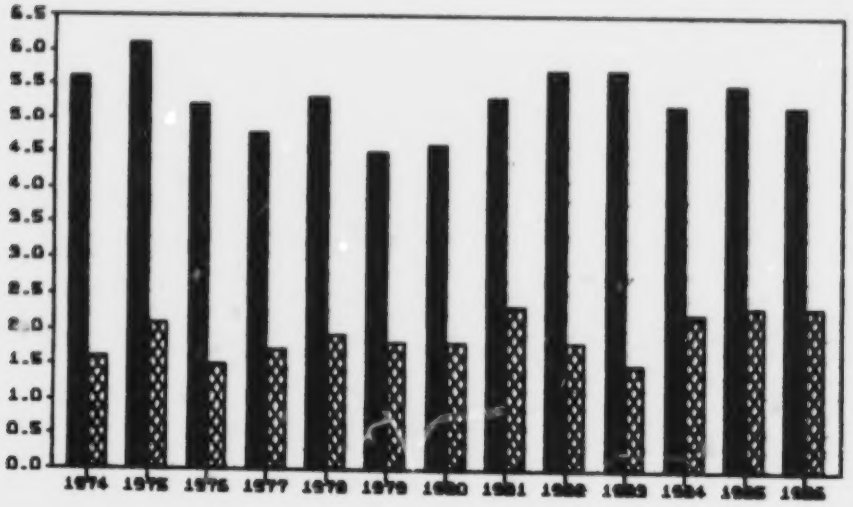
ID NUMBER : 12-0004-010-01

WATERSHED AREA	: 174.00	sq.km	
SURFACE AREA	: 1061.0	ha.	
MAX DEPTH	: 45.00	m.	
VOLUME	: 152.39	mill cu. m.	

SHORELINE	: 36.20 km.
COTTAGES	: 220 + 3 HOUSES
RESORTS	: 4 (51)
% CROWN LAND	: 20

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1974 ‡‡	5.6	1.6
1975 ‡‡	6.1	2.1
1976	5.2	1.5
1977	4.8	1.7
1978	5.3	1.9
1979	4.5	1.8
1980 ‡	4.6	1.8
1981 ‡‡	5.3	2.3
1982	5.7	1.8
1983	5.7	1.5
1984	5.2	2.2
1985	5.5	2.3
1986	5.2	2.3
MEAN	5.2	1.9
MAX	6.1	2.3
MIN	4.5	1.5
N	13	13
SD	0.46	0.30

NOTE : ‡ Based on less than 6 readings.
‡‡ Recreational lakes included.



DIAMOND LAKE

Seven samples were collected from June 8 to September 28. Chlorophyll concentrations declined during the summer but insufficient sampling was carried out to clearly delineate any seasonal influence on the results. While not enough sampling was carried out to draw any definitive conclusions about the presence of a seasonal trend in water quality in Diamond Lake, the Self Help Program data adequately demonstrate that Diamond Lake has excellent water quality with well above average Secchi disc visibility.

Higher concentrations of chlorophyll in 1985 and 1986 compared to the earlier long term historical record are the result of an improvement made to the analysis of chlorophyll in 1985.

Compared to 1985 conditions, Diamond Lake experienced a slight increase in chlorophyll concentrations and a corresponding marginal decline in water clarity. This pattern was observed in other lakes in the Self Help Program during 1986 and is believed to be the result of the unusually wet weather that occurred during the summer.

LAKE : DIAMOND LAKE
TWP : HERSHEL
COUNTY : HASTINGS

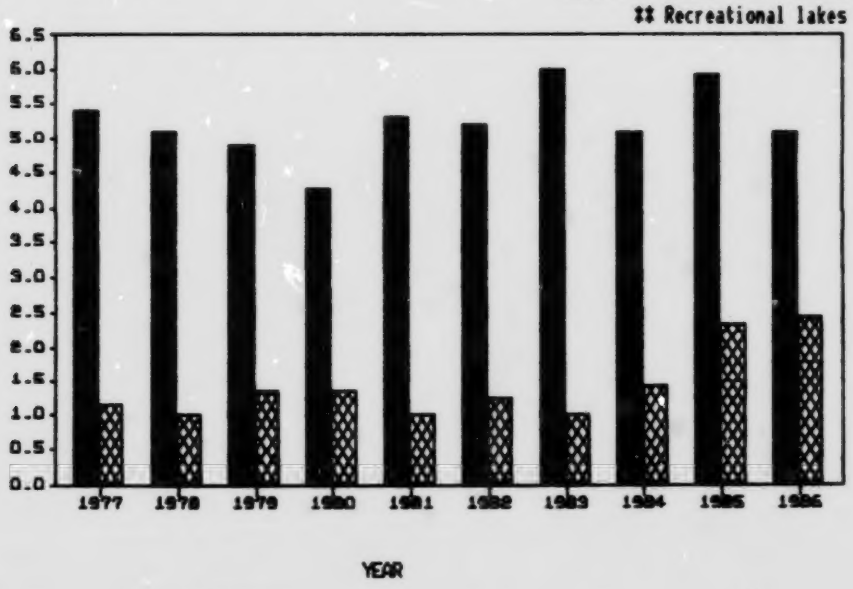
ID NUMBER : 18-3490-015-01

WATERSHED AREA	: 32.70	sq.km	SHORELINE	: 10.00 km.
SURFACE AREA	: 150.0	ha.	COTTAGES	: 65 + 16 HOUSES
MAX DEPTH	: 23.80	m.	RESORTS	: 1 (6)
VOLUME	: 12.48	mill cu. m.	% CROWN LAND	: 60

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/08/86	5.2	4.9
07/01/86	4.6	3.0
07/27/86	5.8	1.6
08/04/86	5.5	2.0
08/31/86	4.9	1.6
09/21/86	4.9	2.1
09/28/86	5.2	2.1
MEAN	5.1	2.4
MAX	5.8	4.9
MIN	4.6	1.6
N	7	7
SD	0.40	1.17

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1977 ‡‡	5.4	1.1
1978	5.1	1.0
1979 ‡	4.9	1.3
1980	4.3	1.3
1981	5.3	1.0
1982 ‡	5.2	1.2
1983 ‡	6.0	1.0
1984 ‡‡	5.1	1.4
1985 ‡	5.9	2.3
1986	5.1	2.4
MEAN	5.2	1.4
MAX	6.0	2.4
MIN	4.3	1.0
N	10	10
SD	0.48	0.52

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



DICKEY LAKE

A total of 11 samples collected between June 6 and September 1 from each of the north basin and the south basin provided good seasonal of water quality conditions in Dickey Lake. The results show very little seasonal variability in either Secchi disc visibility depths or chlorophyll concentrations. The 1986 results and the long term historical seasonal average record indicate the deeper south basin is slightly less productive than the north basin.

The Shawano subdivision resulted in the creation of several hundred cottage lots on Dickey Lake during the 1970's and provided an unique opportunity in the Region to assess the adequacy of existing development controls such as septic tank installation regulations for the protection of water quality.

The 1986 results indicate that Dickey Lake has among the best water quality of any lake in the Self Help Program while the historical record confirms that there has been no deterioration of water quality over the period of record.

Higher chlorophyll concentrations in 1985 and 1986 compared to the earlier record are the result of an improvement to the procedure for the analysis of chlorophyll introduced by the laboratory in 1985. The new procedure increases the recovery and detection of chlorophyll from lake water samples.

A decline in Secchi disc visibility depth from 1985 is part of a wide spread loss in water clarity thought to be the result of the unusually wet weather experienced during the summer.

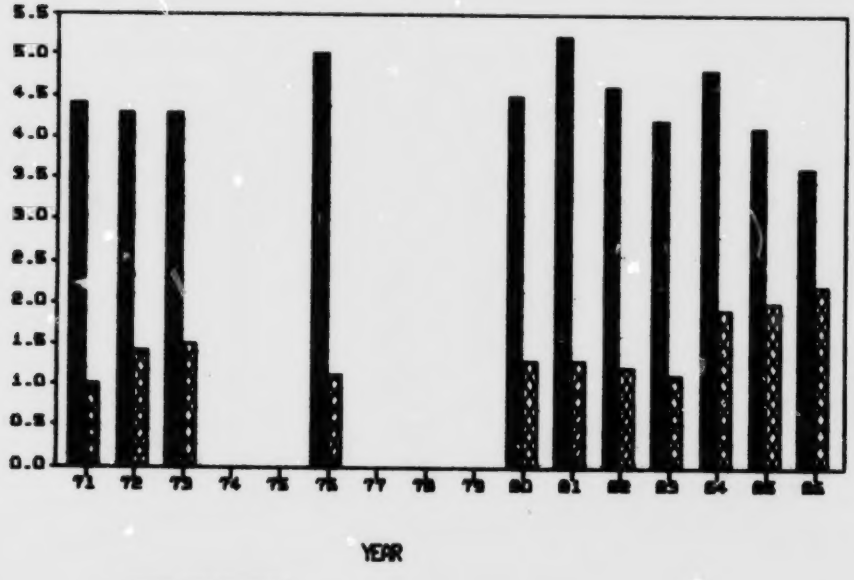
LAKE : DICKEY LAKE : NORTH BASIN ID NUMBER : 17-0021-004-01
TWP : LAKE
COUNTY : HASTINGS

WATERSHED AREA	: 49.00	sq.km	SHORELINE	: 4.59	km.
SURFACE AREA	: 54.0	ha.	COTTAGES	: 73	
MAX DEPTH	: 12.20	m.	RESORTS	: 0	
VOLUME	: 9.69	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/06/86	2.9	1.8
06/16/86	3.1	2.9
07/02/86	3.3	2.8
07/07/86	3.1	1.8
07/13/86	3.3	1.7
07/28/86	4.1	2.0
08/04/86	3.9	2.7
08/10/86	4.3	2.2
08/21/86	3.6	2.4
08/25/86	4.0	2.3
09/01/86	4.0	2.0
MEAN	3.6	2.2
MAX	4.3	2.9
MIN	2.9	1.7
N	11	11
SD	0.48	0.42

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1971 ‡	4.4	1.0
1972	4.3	1.4
1973	4.3	1.5
1976 ‡‡	5.0	1.1
1980 ‡‡	4.5	1.3
1981	5.2	1.3
1982	4.6	1.2
1983	4.2	1.1
1984 ‡	4.8	1.9
1985	4.1	2.0
1986	3.6	2.2
MEAN	4.4	1.4
MAX	5.2	2.2
MIN	3.6	1.0
N	11	11
SD	0.44	0.40

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



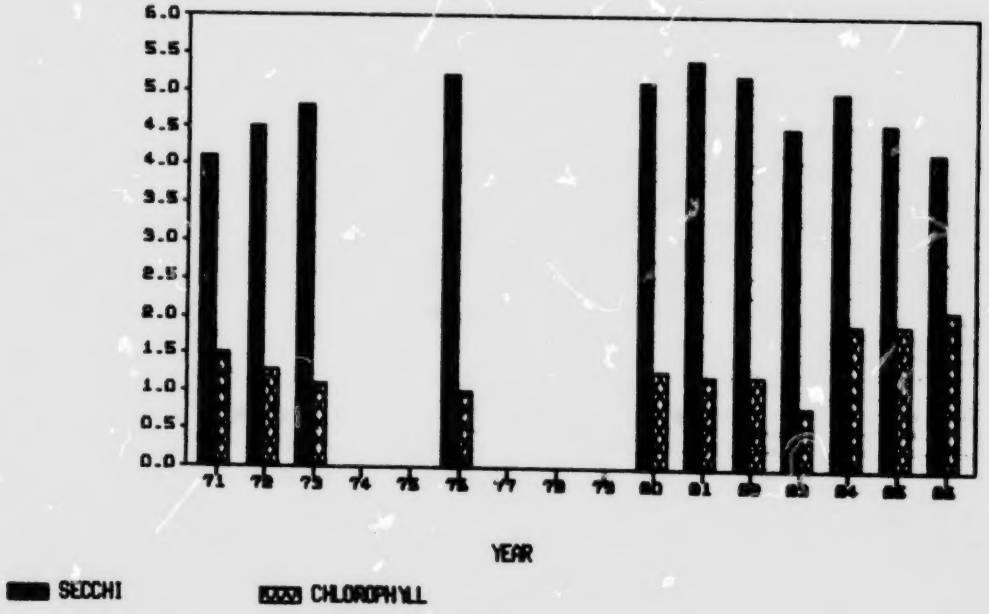
LAKE : DICKEY LAKE : SOUTH BASIN ID NUMBER : 17-0021-005-01
TWP : LAKE
COUNTY : HASTINGS

WATERSHED AREA	: 5.46	sq.km	SHORELINE	: 12.55	km.
SURFACE AREA	: 149.0	ha.	COTTAGES	: 24	
MAX DEPTH	: 46.30	m.	RESORTS	: 0	
VOLUME	: 26.74	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/06/86	4.3	2.3
06/16/86	3.7	3.0
07/02/86	4.4	2.2
07/07/86	3.7	2.4
07/13/86	3.7	1.8
07/28/86	4.3	1.8
08/04/86	4.7	2.0
08/10/86	4.8	2.4
08/21/86	3.9	1.7
08/25/86	4.6	1.8
09/01/86	5.1	1.7
MEAN	4.2	2.1
MAX	5.1	3.0
MIN	3.7	1.7
N	11	11
SD	0.49	0.40

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1971 ‡	4.1	1.5
1972	4.5	1.3
1973	4.8	1.1
1976 ‡‡	5.2	1.0
1980	5.1	1.3
1981	5.4	1.2
1982	5.2	1.2
1983	4.5	0.8
1984	5.0	1.9
1985	4.6	1.9
1986	4.2	2.1
MEAN	4.7	1.3
MAX	5.4	2.1
MIN	4.1	0.8
N	11	11
SD	0.43	0.41

NOTE : ‡ Based on less than 6 readings.
‡‡ Recreational lakes included.



EAGLE LAKE

Sampling at two locations between June 9 and September 24 provided good seasonal coverage of water quality conditions in Eagle Lake. Chlorophyll concentrations did not vary much but Secchi disc visibility declined slightly as the season progressed. The decline in water clarity over the duration of the sampling season was also observed in Eagle Lake during 1985.

Higher chlorophyll concentrations in 1985 and 1986 compared to the earlier period of record are the result of an improvement in the procedure for the analysis of chlorophyll introduced by the laboratory in 1985 to increase the recovery and detection of chlorophyll from lake water samples. Measured chlorophyll concentrations in 1985 actually represent a decline from 1985 levels.

The results show that Eagle Lake has very good water quality with no evidence of any deterioration over the period of record.

LAKE : EAGLE LAKE
TWP : OLDEN, HINCHINBROOKE
COUNTY : FRONTENAC

ID NUMBER : 18-0033-019-01

WATERSHED AREA	: 40.10	sq.km	SHORELINE	: 41.40 km.
SURFACE AREA	: 665.0	ha.	COTTAGES	: 135 + 1 HOUSE
MAX DEPTH	: 31.10	m.	RESORTS	: 2
VOLUME	: 67.20	mill cu. m.	% CROWN LAND	: 5

STATION 1 NEAR OPEONGO POINT

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/09/86	5.3	2.4
06/22/86	5.5	2.6
06/30/86	5.7	2.5
07/07/86	5.6	2.2
07/13/86	5.7	2.1
07/28/86	5.9	2.8
08/04/86	5.0	3.2
08/13/86	5.0	2.1
08/17/86	5.3	2.5
08/25/86	5.3	3.6
09/01/86	5.0	2.9
09/07/86	5.0	2.3
MEAN	5.3	2.6
MAX	5.9	3.6
MIN	5.0	2.1
N	12	12
SD	0.32	0.46

STATION 2 NEAR OPEONGO POINT

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/09/86	6.1	3.5
06/20/86	6.1	2.9
06/29/86	6.4	
07/07/86	5.1	3.3
07/19/86	6.1	4.2
07/28/86	5.6	3.0
08/10/86	5.2	4.7
08/17/86	5.8	3.0
08/31/86	4.3	2.6
09/24/86	4.9	2.2
MEAN	5.5	3.2
MAX	6.4	4.7
MIN	4.3	2.2
N	10	9
SD	0.67	0.78

LAKE : EAGLE LAKE
TWP : OLDEN, HINCHINBROOKE
COUNTY : FRONTENAC

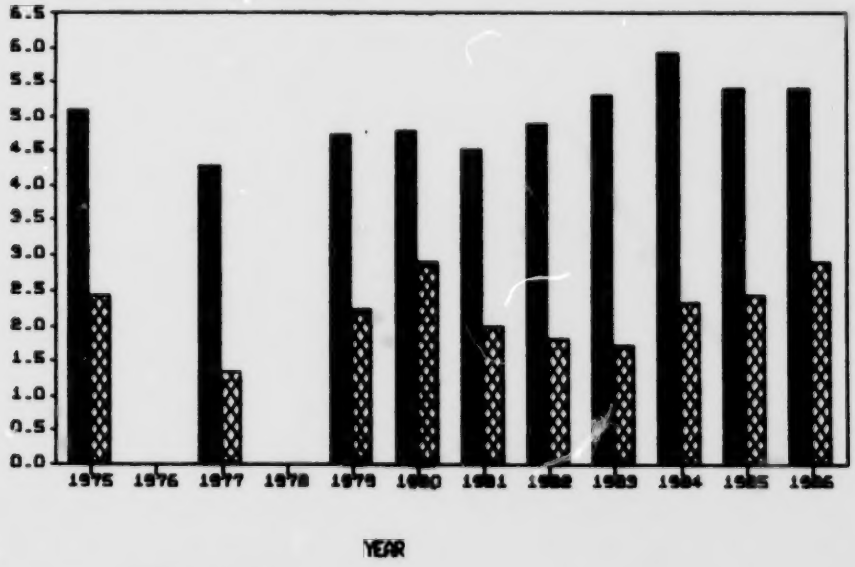
ID NUMBER : 18-0033-019-01

WATERSHED AREA	: 40.10	sq.km	SHORELINE	: 41.40	km.
SURFACE AREA	: 665.0	ha.	COTTAGES	: 135 + 1	HOUSE
MAX DEPTH	: 31.10	m.	RESORTS	: 2	
VOLUME	: 67.20	mill cu. m.	% CROWN LAND	: 5	

NEAR OPEONGO POINT

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	5.1	2.4
1977	4.3	1.3
1979	4.7	2.2
1980	4.8	2.9
1981 ‡‡	4.5	2.0
1982	4.9	1.8
1983	5.3	1.7
1984	5.9	2.3
1985	5.4	2.4
1986	5.4	2.9
MEAN	5.0	2.1
MAX	5.9	2.9
MIN	4.3	1.3
N	10	10
SD	0.48	0.51

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



ELBOW LAKE

Six samples were collected well timed between mid June and mid September. The highest chlorophyll concentration coincided with the best Secchi disc visibility depth reading on July 20. Otherwise chlorophyll concentrations were steady while water clarity generally declined slightly throughout the summer.

Higher chlorophyll concentrations in 1985 and 1986 compared to the earlier record are partly the result of an improved procedure for the analysis of chlorophyll introduced by the laboratory in 1985. The improvement increases the recovery and detection of chlorophyll from lake water samples. Not withstanding the change in the laboratory procedure, there has been a gradual increase in the seasonal mean chlorophyll concentration for Elbow Lake and a corresponding loss in water clarity since 1983 as measured through the Self Help Program.

The increase in chlorophyll concentration and decline in Secchi disc visibility depth during 1986 is likely the result of the unusually wet weather experienced during the summer. This same pattern was observed in other lakes in the Self Help Program during 1986.

LAKE : ELBOW LAKE
TWP : HINCHINBROOKE
COUNTY : FRONTENAC

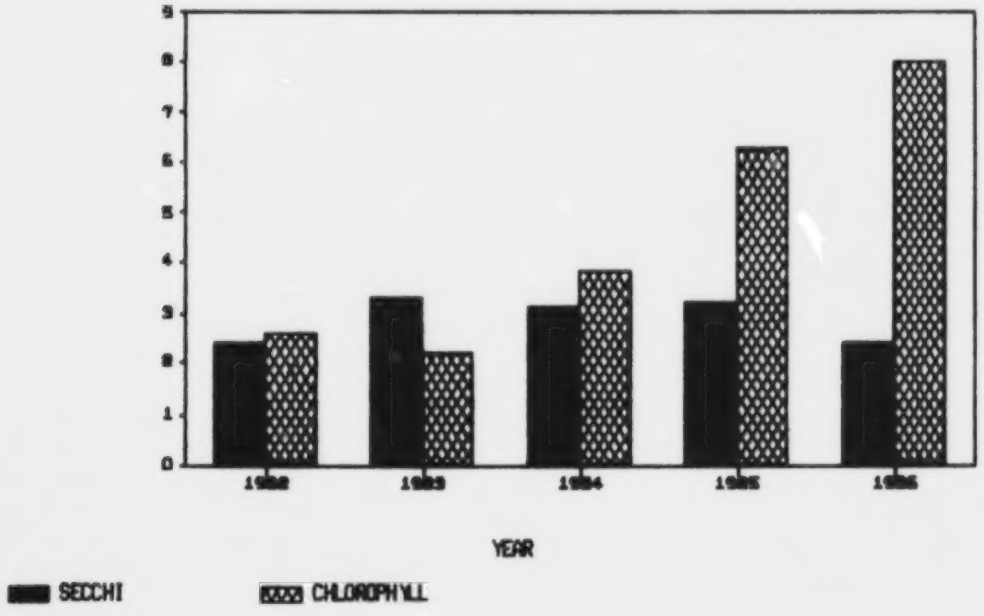
ID NUMBER : 18-0033-035-01

WATERSHED AREA	: 19.20	sq.km	SHORELINE	: 13.32	km.
SURFACE AREA	: 126.0	ha.	COTTAGES	: 46	
MAX DEPTH	: 9.80	m.	RESORTS	: 1 (5)	
VOLUME	: 6.56	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/15/86	2.6	7.3
06/21/86	2.8	6.6
07/20/86	2.9	10.0
08/17/86	2.1	8.2
08/31/86	2.3	7.5
09/13/86	2.0	8.5
MEAN	2.4	8.0
MAX	2.9	10.0
MIN	2.0	6.6
N	6	6
SD	0.37	1.18

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1982 ‡‡	2.4	2.6
1983	3.3	2.2
1984	3.1	3.8
1985	3.2	6.3
1986	2.4	8.0
MEAN	2.8	4.5
MAX	3.3	8.0
MIN	2.4	2.2
N	5	5
SD	0.44	2.49

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



FARREN (FARRELL) LAKE

Insufficient sampling was carried out during 1986 to obtain meaningful results. A minimum of six sets of measurements each year is necessary to adequately characterize the water quality of a lake and preferably 12 or more sets of measurements evenly timed throughout the ice free season from May to October to define any seasonal trends if they are present.

Nevertheless, the results for 1986 tend to indicate that Farren Lake continues to exhibit the same good water quality conditions documented by the record of participation in the Self Help Program since 1980.

A shoreland classification survey for the Farren Lake Cottage Association was conducted by the Ministry of Natural Resources during the summer. The survey classified and identified areas of artificial shoreline. Areas of artificial shoreline can be naturalized by the reintroduction of natural vegetation for the purpose of improving the lake environment.

The Association is encouraged to increase sampling in 1987 so that a more realistic evaluation of water quality can be made for Farren Lake.

LAKE : FARREN (FARRELL) LAKE
TWP : SOUTH SHERBROOKE
COUNTY : LANARK

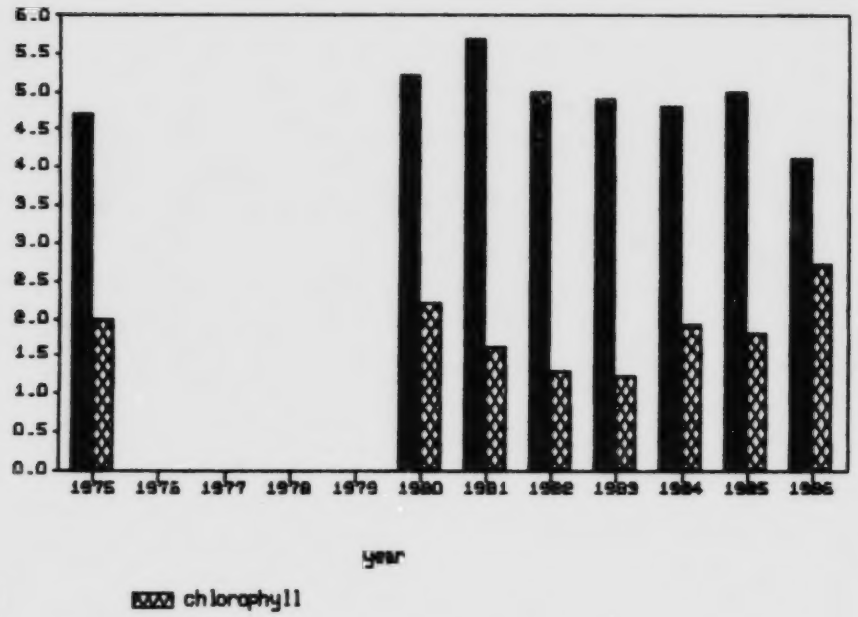
ID NUMBER : 18-0033-020-01

WATERSHED AREA	: 12.25	sq.km	SHORELINE	: 9.50	km.
SURFACE AREA	: 173.0	ha.	COTTAGES	: 101	(1974)
MAX DEPTH	: 21.30	m.	RESORTS	: 1	(6)
VOLUME	: 14.32	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/19/86	4.1	3.3
07/02/86	4.3	3.0
08/04/86	4.4	2.8
08/14/86	4.1	2.2
09/27/86	4.0	2.4
MEAN	4.1	2.7
MAX	4.4	3.3
MIN	4.0	2.2
N	5	5
SD	0.16	0.44

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	4.7	2.0
1980 ‡‡	5.2	2.2
1981	5.7	1.6
1982	5.0	1.3
1983	4.9	1.2
1984	4.8	1.9
1985	5.0	1.8
1986 ‡	4.1	2.7
MEAN	4.9	1.8
MAX	5.7	2.7
MIN	4.1	1.2
N	8	8
SD	0.45	0.49

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



GANANOQUE LAKE

A good sampling program was carried out with nine samples collected from June 8 to September 21. Chlorophyll concentrations peaked in August but without a corresponding loss in water clarity. The chlorophyll concentrations were not high enough to indicate a problem with algae.

Higher chlorophyll concentrations in 1985 and 1986 compared to the earlier record are the result of an improvement to the procedure for the analysis of chlorophyll introduced by the laboratory in 1985. Compared to 1984 data, these concentrations represent a decline in algal levels in real terms.

Gananoque Lake was among the few lakes that did not experience either higher chlorophyll levels or reduced water clarity compared to conditions in 1985.

The data for Gananoque Lake indicate it has good water quality.

LAKE : GANANOQUE LAKE
TWP : REAR & FRONT OF LEEDS LANSDOWNE
COUNTY : LEEDS

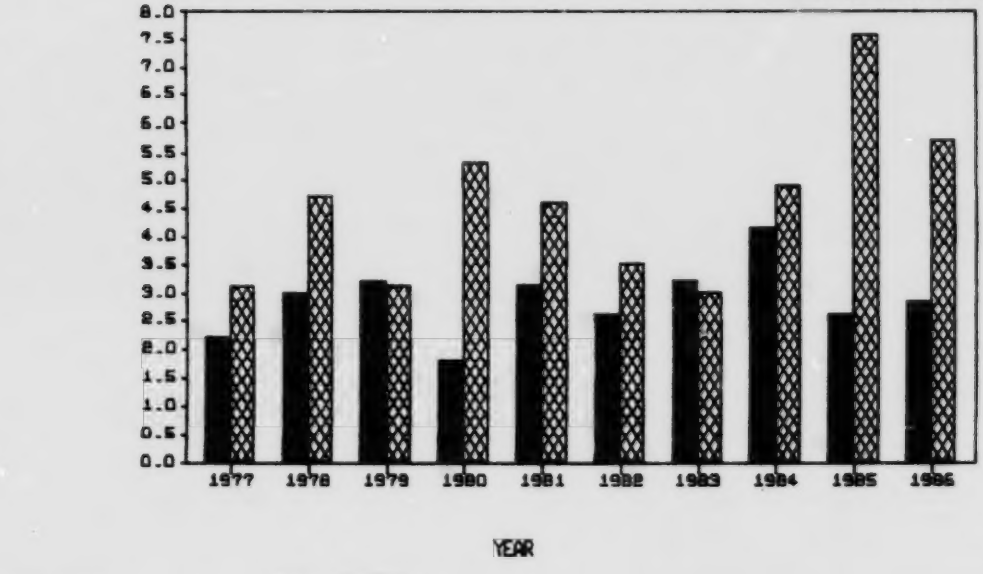
ID NUMBER : 12-0017-008-01

WATERSHED AREA	: 424.40	sq.km	SHORELINE	: 33.17 km.
SURFACE AREA	: 617.0	ha.	COTTAGES	: 111
MAX DEPTH	: 23.77	m.	RESORTS	: 2 (19)
VOLUME	: 42.82	mill cu. m.	% CROWN LAND	: 3

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/08/86	2.7	2.4
06/22/86	3.1	2.4
07/02/86	2.9	6.6
07/13/86	2.7	
07/27/86	2.7	7.4
08/10/86	2.9	7.4
08/17/86	2.9	8.2
09/01/86	3.1	7.3
09/21/86	2.7	4.6
MEAN	2.8	5.7
MAX	3.1	8.2
MIN	2.7	2.4
N	9	8
SD	0.17	2.34

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1977	2.2	3.1
1978	3.0	4.7
1979	3.2	3.1
1980	1.8	5.3
1981 ‡‡	3.1	4.6
1982 ‡‡	2.6	3.5
1983 ‡‡	3.2	3.0
1984 ‡‡	4.1	4.9
1985	2.6	7.6
1986	2.8	5.7
MEAN	2.8	4.5
MAX	4.1	7.6
MIN	1.8	3.0
N	10	10
SD	0.63	1.45

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



GREEN LAKE

Since only seven samples were collected it is not possible to identify the presence or absence of any seasonal trends in water quality. Nevertheless, the results clearly show that Green Lake is characterized by an extremely low level of productivity and has excellent water clarity.

The appearance of a filamentous benthic (attached to the bottom) algae in Green Lake is under investigation by the Ministry of the Environment.

LAKE : GREEN LAKE
TWP : RADCLIFFE
COUNTY : RENFREW

ID NUMBER : 18-3490-048-01

WATERSHED AREA	: 15.61	sq.km	SHORELINE	: 2.9	km.
SURFACE AREA	: 29.1	ha.	COTTAGES	: 3	
MAX DEPTH	: 22.5	m.	RESORTS	: 0	
VOLUME	: 2.12	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/26/86	4.7	4.3
07/02/86	4.7	2.3
07/14/86	5.2	1.7
07/22/86	6.1	1.8
08/05/86	6.4	1.7
08/12/86	6.4	1.7
08/26/86	5.8	2.3
MEAN	5.6	2.2
MAX	6.4	4.3
MIN	4.7	1.7
N	7	7
SD	0.75	0.94

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1986	5.6	2.2

GRIPPEN LAKE

Insufficient sampling was carried out during 1986 to look for the presence of seasonal trends in water quality. In previous years the results have shown that considerable variability occurs in water clarity and chlorophyll concentrations of Grippen Lake that does not conform to any consistent seasonal pattern from year to year.

Higher chlorophyll concentrations for 1985 and 1986 compared to most previous years of record are the result of a change in the analytical procedure for chlorophyll introduced by the laboratory in 1985. The new procedure has increased the recovery and detection of chlorophyll from lake water samples.

An increase in chlorophyll concentrations and a decline in water clarity from 1985 to 1986 was observed. This pattern of events was observed in other lakes and is likely due to the unusually wet weather experienced during the summer.

The Darling family and other members of the Grippen Lake North Shore Cottage Association have a record of participation in the Self Help Program extending back to 1976.

LAKE : GRIPPEN LAKE
TWP : REAR OF LEEDS & LANSDOWNE
COUNTY : LEEDS

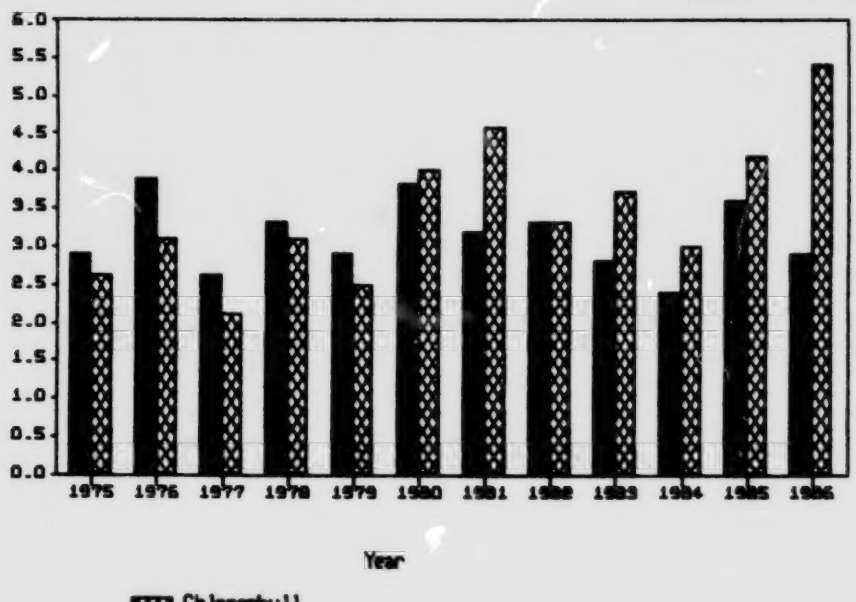
ID NUMBER : 12-0017-010-01

WATERSHED AREA	: 20.30	sq.km	SHORELINE	: 7.72	km.
SURFACE AREA	: 191.0	ha.	COTTAGES	: 76	
MAX DEPTH	: 16.00	m.	RESORTS	: 1 (24)	
VOLUME	: 22.03	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/06/86	1.8	9.9
07/29/86	2.1	3.0
08/04/86	2.4	6.3
09/01/86	3.8	
09/07/86	3.7	4.2
10/13/86	3.8	3.6
MEAN	2.9	5.4
MAX	3.8	9.9
MIN	1.8	3.0
N	6	5
SD	0.93	2.81

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975	2.9	2.6
1976	3.9	3.1
1977	2.6	2.1
1978	3.3	3.1
1979	2.9	2.5
1980	3.8	4.0
1981 ‡‡	3.2	4.6
1982 ‡‡	3.3	3.3
1983 ‡‡	2.8	3.7
1984 ‡‡	2.4	3.0
1985	3.6	4.2
1986	2.9	5.4
MEAN	3.1	3.4
MAX	3.9	5.4
MIN	2.4	2.1
N	12	12
SD	0.47	0.95

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



HAY BAY

An excellent program was conducted with 15 sets of samples collected from the end of June to early November.

Chlorophyll concentrations generally increased throughout the season while Secchi disc visibility declined from a depth of 2.6 metres to just marginally more than 1 metre.

Water quality in Hay Bay is not particularly well suited for water oriented activities such as swimming and bathing.

Hay Bay has not responded to reductions in nutrient loads and experienced an improvement in water quality as the rest of the Bay of Quinte. Major nutrient loading reductions have been achieved over recent years by improved treatment of sewage by municipalities discharging to the Bay of Quinte.

Mr. J. F. Sanderson was awarded a plaque by the Ministry of the Environment in recognition of his ten year record of water quality sampling on Hay Bay.

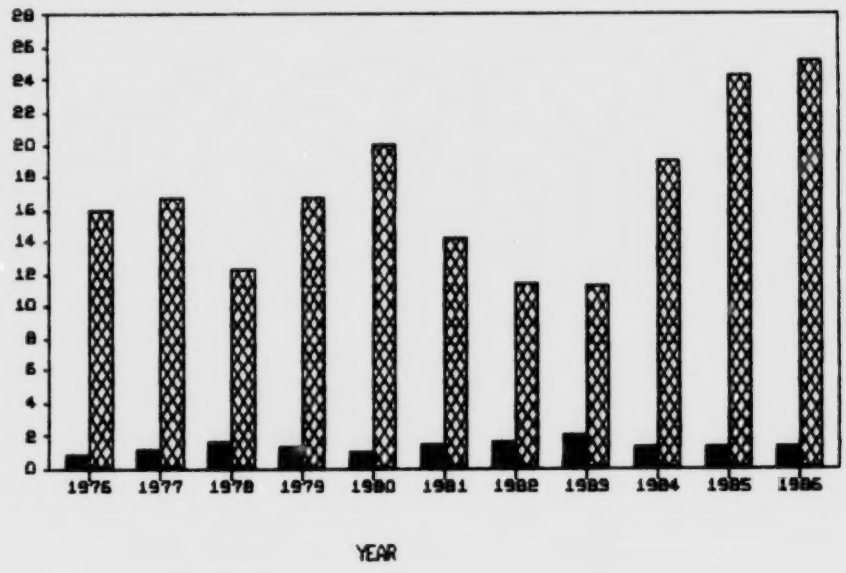
LAKE : HAY BAY - BAY OF QUINTE ID NUMBER : 17-0037-001-01
TWP : NORTH & SOUTH FREDERICKSBURG
COUNTY : LENNOX & ADDINGTON

WATERSHED AREA	:	sq.km	SHORELINE	:	km.
SURFACE AREA	:	ha.	COTTAGES	:	
MAX DEPTH	:	m.	RESORTS	:	6 (211)
VOLUME	:	mill cu. m.	% CROWN LAND	:	0

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/24/86	2.6	5.8
06/30/86	1.2	13.7
07/07/86	1.5	16.5
07/15/86	1.7	13.2
07/20/86	1.5	16.7
08/06/86	1.2	30.2
08/13/86	1.2	35.8
08/19/86	1.4	25.0
08/25/86	1.4	33.7
09/03/86	1.4	24.6
09/17/86	0.9	30.3
09/25/86	1.2	29.8
10/16/86	1.2	40.7
10/20/86	1.4	34.9
11/03/86	1.1	
MEAN	1.3	25.0
MAX	2.6	40.7
MIN	0.9	5.8
N	15	14
SD	0.39	10.35

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1976 ‡	0.8	16.0
1977	1.1	16.6
1978	1.5	12.2
1979	1.2	16.6
1980	1.0	19.9
1981	1.4	14.2
1982	1.6	11.3
1983	2.0	11.2
1984 ‡	1.2	18.9
1985 ‡	1.3	24.2
1986	1.3	25.0
MEAN	1.3	16.9
MAX	2.0	25.0
MIN	0.8	11.2
N	11	11
SD	0.32	4.76

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



INDIAN LAKE

Ten samples collected between June 26 and September 17 provided good temporal coverage but did not reveal the presence of any pronounced seasonal trend.

Higher chlorophyll concentrations in 1985 and 1986 compared to the earlier record are the result of an improvement to the procedure for the analysis of chlorophyll introduced by the laboratory in 1985.

The results reflect good water quality in Indian Lake.

LAKE : INDIAN LAKE
TWP : SOUTH CROSBY
COUNTY : LEEDS

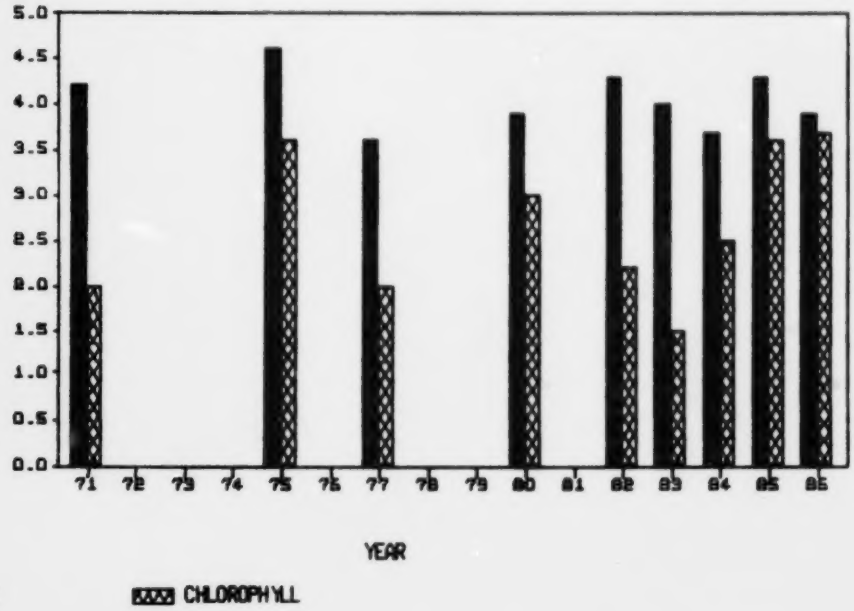
ID NUMBER : 12-0004-013-01

WATERSHED AREA	: 359.00	sq.km	SHORELINE	: 16.58	km.
SURFACE AREA	: 266.0	ha.	COTTAGES	: 106	
MAX DEPTH	: 26.00	m.	RESORTS	: 2 (11)	
VOLUME	: 26.79	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/26/86	3.4	3.8
07/08/86	3.9	3.5
07/16/86	4.6	3.4
07/24/86	4.4	3.5
07/30/86	3.3	3.5
08/05/86	3.7	3.1
08/11/86	3.5	5.1
08/26/86	3.2	3.9
09/03/86	4.0	2.9
09/17/86	5.0	4.8
MEAN	3.9	3.7
MAX	5.0	5.1
MIN	3.2	2.9
N	10	10
SD	0.60	0.70

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1971 ‡‡	4.2	2.0
1975 ‡‡	4.6	3.6
1977	3.6	2.0
1980	3.9	3.0
1982	4.3	2.2
1983 ‡‡	4.0	1.5
1984	3.7	2.5
1985	4.3	3.6
1986	3.9	3.7
MEAN	4.0	2.6
MAX	4.6	3.7
MIN	3.6	1.5
N	9	9
SD	0.32	0.82

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



JEFFREY LAKE

A total of 16 samples collected between the end of April and late September provided good seasonal coverage but did not reveal the presence of any trend in the results.

Chlorophyll concentrations were generally low and water clarity was excellent.

Higher chlorophyll concentrations in 1985 and 1986 compared to the earlier record are the result of an improvement in the procedure for the analysis of chlorophyll introduced by the laboratory in 1985.

Higher concentrations in 1985 compared to 1986 along with a decline in water clarity is a pattern that was seen in other lakes in the Self Help Program and may be the result the unusually wet weather experienced during the summer.

LAKE : JEFFREY LAKE
TWP : FARADAY
COUNTY : HASTINGS

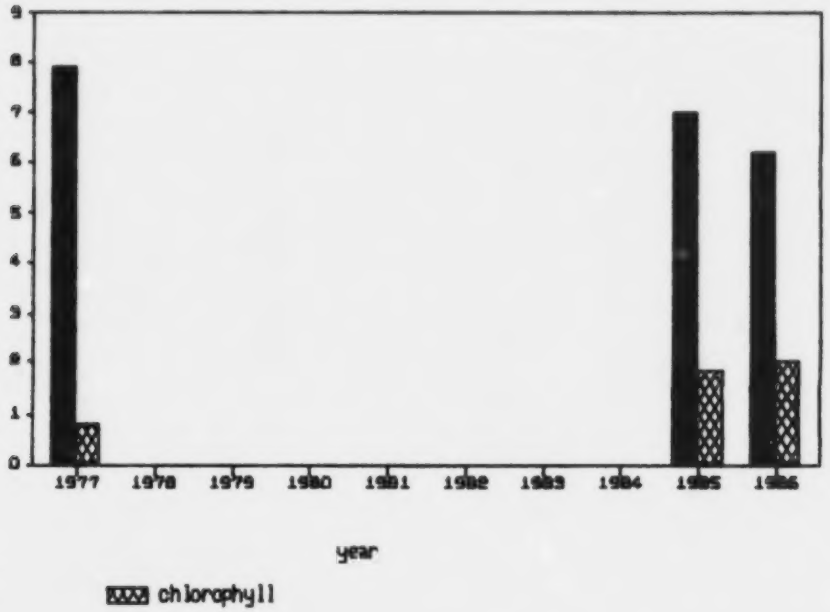
ID NUMBER : 18-3490-047-01

WATERSHED AREA	: 19.20 sq.km	SHORELINE	: 7.57 km.
SURFACE AREA	: 113.0 ha.	COTTAGES	: 89
MAX DEPTH	: 24.4 m.	RESORTS	: 1 (15)
VOLUME	: 10.19 mill cu. m.	% CROWN LAND	: 35

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
04/30/86	5.2	1.6
05/11/86	6.2	2.4
05/18/86	7.3	1.4
05/29/86	5.6	1.0
06/09/86	6.9	
06/18/86	6.6	1.1
06/22/86	7.3	
07/01/86	6.1	1.2
07/06/86	6.5	1.2
07/21/86	6.1	1.3
08/11/86	5.5	2.8
08/17/86	5.8	1.8
09/01/86	6.7	1.5
09/09/86	5.8	8.5
09/14/86	4.9	1.5
09/29/86	8.2	1.7
MEAN	6.2	2.0
MAX	8.2	8.5
MIN	4.9	1.0
N	16	14
SD	0.86	1.92

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1977 ‡‡	7.9	0.8
1985	7.0	1.8
1986	6.2	2.0
MEAN	7.0	1.5
MAX	7.9	2.0
MIN	6.2	0.8
N	3	3
SD	0.85	0.64

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



JEFFREYS (OLMSTEAD) LAKE

Three out of the seven samples collected for chlorophyll analysis were lost so there were was insufficient data to look for trends or make comparisons with results from previous years.

Water clarity in Jeffreys Lake has declined from the high clarity measured for the period 1977 to 1983 but is still excellent with a mean Secchi disc visibility depth of 5.3 metres for 1986. This value is well above the average for the lakes in the Self Help Program.

Mr. Bryan Briscoe was presented an award plaque by the Ministry of the Environment at a banquet held in Kingston on September 19, 1986 in recognition of his 10 year contribution to the Self Help Program on Jeffrey Lake.

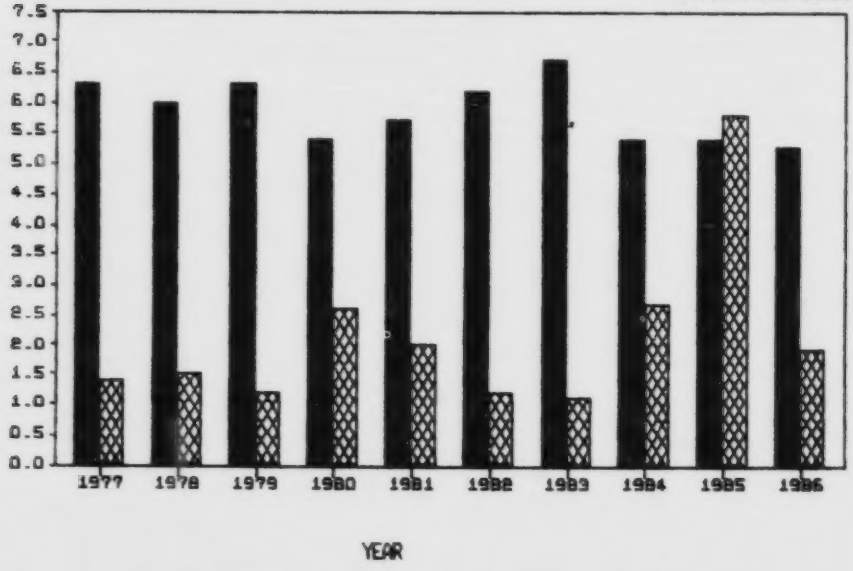
LAKE : JEFFREY'S (OLMSTEAD) LAKE ID NUMBER : 18-4810-001-01
TWP : ROSS
COUNTY : RENFREW

WATERSHED AREA	: 26.80	sq.km	SHORELINE	: 10.60	km.
SURFACE AREA	: 180.0	ha.	COTTAGES	: 98	
MAX DEPTH	: 29.30	m.	RESORTS	: 2 (305)	
VOLUME	: 11.6	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/15/86	6.1	
06/30/86	3.5	1.1
08/11/86	5.5	3.3
08/29/86	6.1	
09/16/86	5.5	2.3
10/05/86	5.2	1.1
11/17/86	5.8	
MEAN	5.3	1.9
MAX	6.1	3.3
MIN	3.5	1.1
N	7	4
SD	0.90	1.06

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1977	6.3	1.4
1978 ‡‡	6.0	1.5
1979	6.3	1.2
1980	5.4	2.6
1981	5.7	2.0
1982	6.2	1.2
1983	6.7	1.1
1984	5.4	2.7
1985 ‡	5.4	5.8
1986	5.3	1.9
MEAN	5.8	2.1
MAX	6.7	5.8
MIN	5.3	1.1
N	10	10
SD	0.49	1.41

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



JOEPERRY LAKE

Ten samples collected between mid June and the end of August provided good coverage of conditions in Joeperry Lake. There was no evidence of any pronounced seasonality in the results.

The results indicate that Joeperry Lake has good water quality.

The most significant finding with respect to the historical record is a continual decline in the annual mean Secchi disc visibility depth since 1981.

Considering that there has been an improvement in the recovery and detection of chlorophyll from lake water samples by a change in the analytical procedure introduced by the laboratory in 1985, algal levels in Joeperry Lake have stayed about the same or declined in the same time period.

The Bon Echo Provincial Park was presented a plaque at a Self Help Program awards ceremony for their 10 or more years record of water quality sampling on Joeperry and Mazinaw Lakes.

LAKE : JOEPERRY LAKE
TWP : EFFINGHAM
COUNTY : LENNOX & ADDINGTON

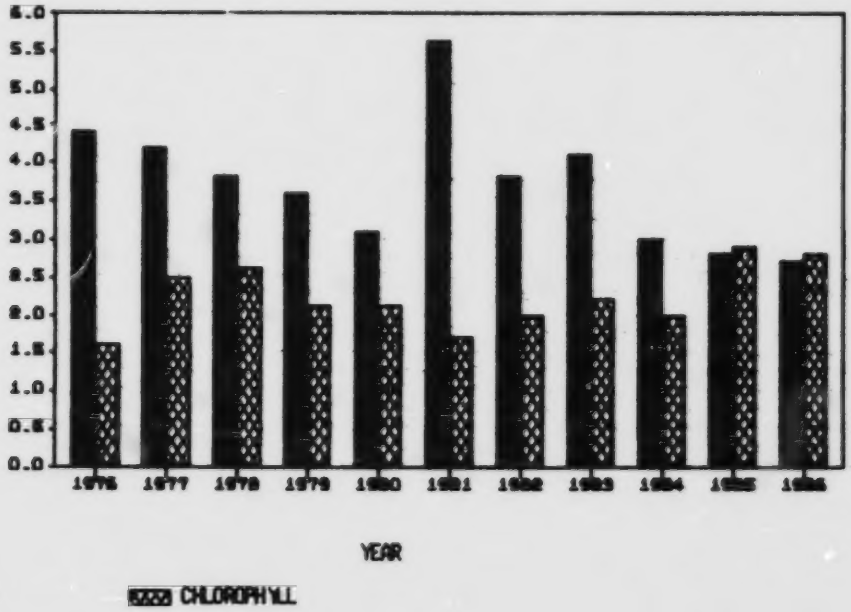
ID NUMBER : 17-0026-001-01

WATERSHED AREA	: 15.40	sq.km	SHORELINE	: 9.00	km.
SURFACE AREA	: 169.0	ha.	COTTAGES	: 0	
MAX DEPTH	: 23.00	m.	RESORTS	: 0	
VOLUME	: 12.35	mill cu. m.	% CROWN LAND	: 100	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/19/86	2.4	3.7
06/26/86	2.7	1.1
07/10/86	2.4	2.3
07/17/86	3.3	2.6
07/24/86	3.1	2.8
07/31/86	2.4	4.3
08/07/86	2.4	2.7
08/14/86	2.7	3.0
08/21/86	3.1	3.4
08/28/86	2.7	2.9
MEAN	2.7	2.8
MAX	3.3	4.3
MIN	2.4	1.1
N	10	10
SD	0.34	0.86

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1976 ‡‡	4.4	1.6
1977	4.2	2.5
1978 ‡	3.8	2.6
1979 ‡	3.6	2.1
1980 ‡	3.1	2.1
1981 ‡	5.6	1.7
1982	3.8	2.0
1983 ‡	4.1	2.2
1984	3.0	2.0
1985	2.8	2.9
1986	2.7	2.8
MEAN	3.7	2.2
MAX	5.6	2.9
MIN	2.7	1.6
N	11	11
SD	0.85	0.42

NOTE : ‡ Based on less than 6 readings.
‡‡ Recreational lakes included.



KASHWAKAMAK LAKE

Eight samples were collected from mid July to September 1. The five Secchi disc visibility depth readings at various nearshore locations taken on September 1 are not a true measure of water clarity as the Secchi disc was resting on bottom at those locations.

The central lake readings indicated excellent water clarity as reflected by a seasonal mean value of over 5 metres. Chlorophyll concentrations were low both at the mid lake and near shore locations. Kashwakamak Lake has excellent water quality well suited for a diversity of recreational pursuits including water oriented activities such as swimming and bathing.

With respect to the long term seasonal average historical record, there has been an apparent improvement in water quality since the lake was last tested in 1980. However conditions are not as impressive as indicated by the mean Secchi disc visibility depth and chlorophyll concentration for the preliminary water quality survey of Kashwakamak Lake completed in 1974 by the Ministry of the Environment.

LAKE : KASHWAKAMAK LAKE
TWP : CLARENDON, BARRIE, MILLER
COUNTY : FRONTENAC

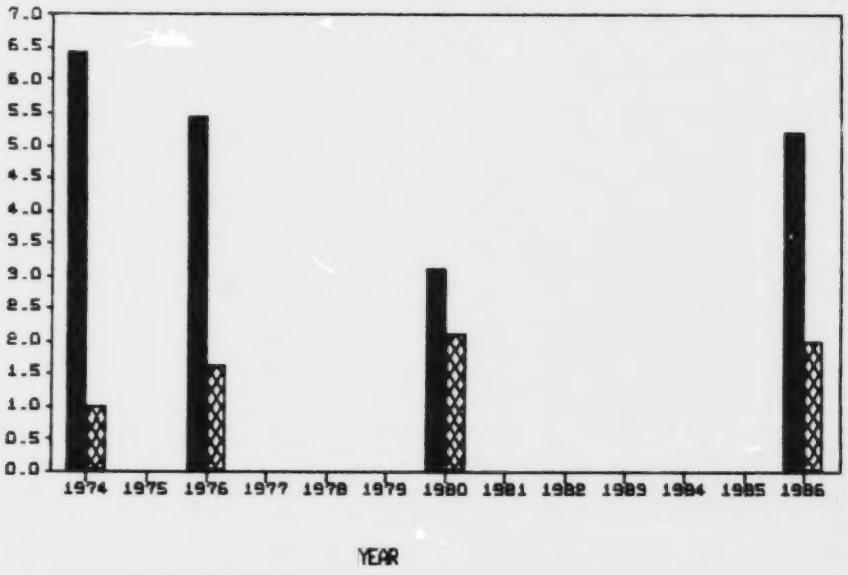
ID NUMBER : 18-3430-010-01

WATERSHED AREA	: 409.8	sq.km	SHORELINE	: 66	km.
SURFACE AREA	: 119.1	ha.	COTTAGES	: 445	
MAX DEPTH	: 21.9	m.	RESORTS	: 12	
VOLUME	: 96.71	mill cu. m.	% CROWN LAND	:	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/13/86	4.9	2.4
07/20/86	4.5	2.2
07/28/86	6.1	1.8
08/05/86	5.8	2.2
08/10/86	4.7	2.2
08/13/86	6.1	2.1
08/20/86	5.6	1.7
09/01/86	4.6	1.6
MEAN	5.2	2.0
MAX	6.1	2.4
MIN	4.5	1.6
N	8	8
SD	0.68	0.29

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1974 ‡‡	6.4	1.0
1976 ‡‡	5.4	1.6
1980 ‡‡	3.1	2.1
1986	5.2	2.0
MEAN	5.0	1.6
MAX	6.4	2.1
MIN	3.1	1.0
N	4	4
SD	1.39	0.50

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



KILLENBECK LAKE

A total of 17 samples collected from early June to October provided good seasonal coverage. Chlorophyll concentrations increased and water clarity deteriorated as the summer progressed. This seasonal pattern was more pronounced during 1986 than during either of the two previous years of sampling on Killenbeck Lake.

Chlorophyll concentrations of the magnitude experienced during 1986 have not been previously encountered in Killenbeck Lake. Increased recovery and detection of chlorophyll from lake water samples by a change in the methodology for chlorophyll analysis introduced by the laboratory in 1985 and the unusually wet weather experienced during the summer may be responsible. Increased amounts of phosphorus in rainfall and runoff may have resulted in the production of more algae in lakes.

The Secchi disc visibility depth and chlorophyll concentration record for 1986 indicate that water quality conditions in Killenbeck Lake were not as favorable for water oriented recreational activities as in previous years. A similar situation was observed in South Lake and Troy Lake.

Owing to the extreme seasonal variability in water quality conditions in Killenbeck Lake, an extensive sampling program such as that carried out during 1986 is necessary to define seasonal patterns and the overall enrichment status of the lake.

LAKE : KILLENBECK LAKE
TWP : REAR OF LEEDS & LANSDOWNE
COUNTY : LEEDS

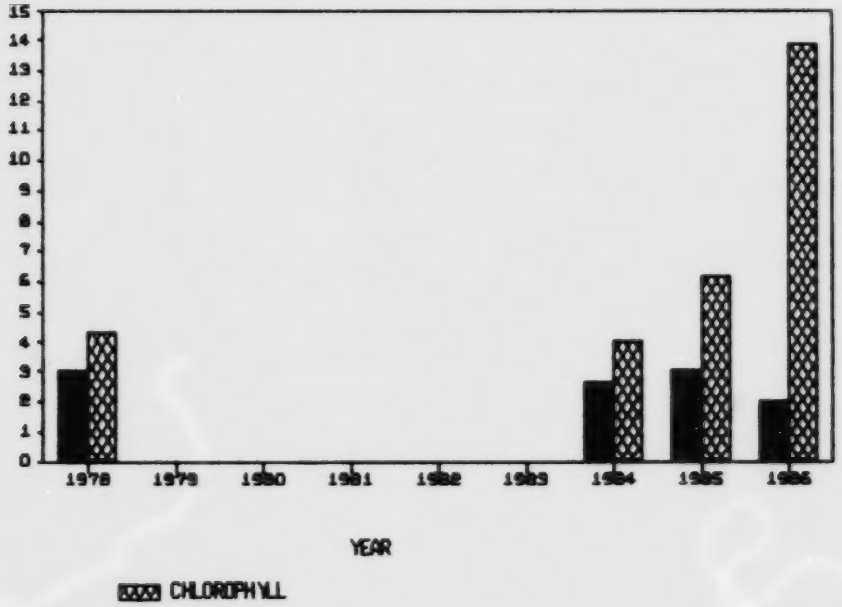
ID NUMBER : 12-0017-011-01

WATERSHED AREA	: 10.90	sq.km	SHORELINE	: 4.70	km.
SURFACE AREA	: 44.0	ha.	COTTAGES	: 14	
MAX DEPTH	: 27.70	m.	RESORTS	:	
VOLUME	: 4.3	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/03/86	2.7	5.5
06/11/86	2.4	14.7
06/18/86	1.8	7.7
06/25/86	2.4	11.9
07/03/86	2.1	15.6
07/09/86	2.4	9.0
07/16/86	2.4	14.2
07/22/86	1.8	25.3
08/06/86	2.4	9.3
08/13/86	2.1	12.3
08/20/86	1.8	15.2
08/27/86	2.1	10.9
09/03/86	1.5	17.5
09/17/86	1.8	19.1
09/24/86	1.5	19.0
10/01/86	1.5	23.0
10/09/86	1.5	7.0
MEAN	2.0	13.9
MAX	2.7	25.3
MIN	1.5	5.5
N	17	17
SD	0.39	5.60

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1978 ‡	3.1	4.3
1984	2.6	4.0
1985	3.1	6.1
1986	2.0	13.9
MEAN	2.7	7.0
MAX	3.1	13.9
MIN	2.0	4.0
N	4	4
SD	0.52	4.64

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



LIMERICK LAKE

Good seasonal coverage was provided by 11 samples collected from the middle of June to the middle of October. Not all the chlorophyll samples were processed for analysis owing to difficulty associated with a change in the laboratory procedure for the determination of chlorophyll. Unfortunately, this problem was not recognized and corrected until near the end of the sampling season.

Based on the chlorophyll samples that were retained for analyses and the Secchi disc depth record Limerick Lake continued to experience excellent water quality. Recent increases in chlorophyll values for 1985 and 1986 can be attributed to the change in the analytical procedure for chlorophyll. The new procedure has improved the recovery and detection of chlorophyll from lake water.

LAKE : LIMERICK LAKE
TWP : LIMERICK
COUNTY : HASTINGS

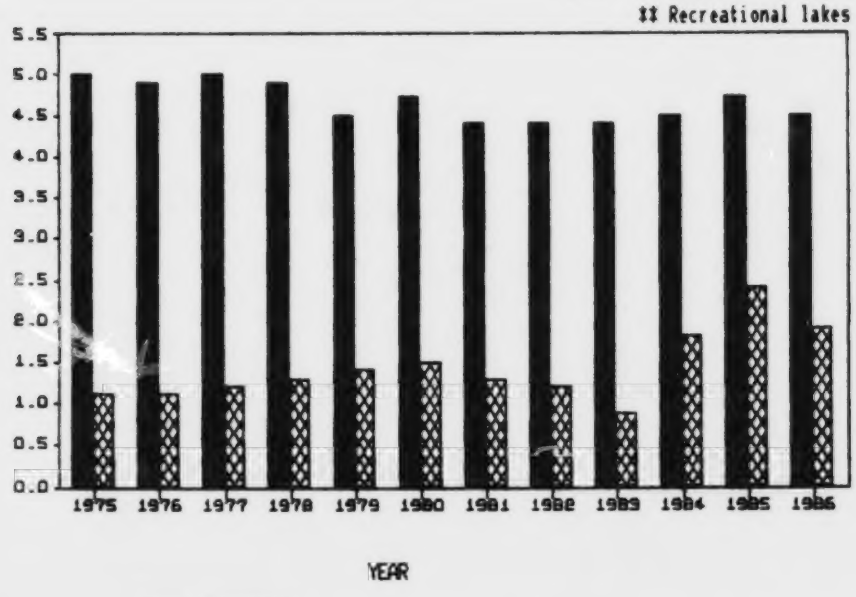
ID NUMBER : 17-0021-010-01

WATERSHED AREA	: 181.41	sq.km	SHORELINE	: 27.00 km.
SURFACE AREA	: 744.0	ha.	COTTAGES	: 130 + 3 HOUSES
MAX DEPTH	: 29.00	m.	RESORTS	: 1 (14)
VOLUME	: 62.87	mill cu. m.	% CROWN LAND	: 1

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/10/86	4.6	
07/01/86	4.6	
07/07/86	4.3	
07/15/86	4.3	
07/27/86	3.9	
08/04/86	4.3	2.4
08/12/86	4.6	
08/19/86	4.6	
09/01/86	4.9	2.3
09/17/86	5.5	
10/20/86	4.9	1.1
MEAN	4.5	1.9
MAX	5.5	2.4
MIN	3.9	1.1
N	11	3
SD	0.42	0.72

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975	5.0	1.1
1976	4.9	1.1
1977 ‡‡	5.0	1.2
1978	4.9	1.3
1979	4.5	1.4
1980	4.7	1.5
1981 ‡	4.4	1.3
1982	4.4	1.2
1983	4.4	0.9
1984	4.5	1.8
1985 ‡‡	4.7	2.4
1986	4.5	1.9
MEAN	4.6	1.4
MAX	5.0	2.4
MIN	4.4	0.9
N	12	12
SD	0.24	0.42

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



LITTLE SILVER LAKE

A total of 14 observations made on water quality conditions in Little Silver Lake at each of two locations from May 12 to October 12 providing excellent seasonal coverage. Chlorophyll concentrations seemed to decline slightly from spring values and then tended to increase from July until the end of sampling in October. This pattern of a weak spring pulse and a late fall peak in the abundance of algae as reflected by chlorophyll concentrations was detected by sampling on Little Silver Lake during 1985.

Higher chlorophyll concentrations reported for 1985 and 1986 are due to improved recovery and detection of chlorophyll from lake samples by an improvement in the analytical procedure for chlorophyll introduced by the laboratory in 1985.

The current results and the long term seasonal average historical record of chlorophyll concentration and Secchi disc visibility depth indicate Little Silver Lake has good water quality.

LAKE : LITTLE SILVER LAKE
TWP : SOUTH SHERBROOKE
COUNTY : LANARK

ID NUMBER : 18-0033-021-01

WATERSHED AREA	: 8.10	sq.km	SHORELINE	: 10.10 km.
SURFACE AREA	: 83.0	ha.	COTTAGES	: 31
MAX DEPTH	: 12.20	m.	RESORTS	: 0
VOLUME	: 3.82	mill cu. m.	% CROWN LAND	: 0

BASIN B

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/18/86	3.7	
05/31/86	3.2	2.9
06/06/86	3.4	2.2
06/15/86	3.2	2.5
06/30/86	3.8	2.4
07/06/86	3.6	4.6
07/15/86	3.5	5.6
07/19/86	4.5	3.2
07/27/86	4.4	2.4
08/03/86	3.1	
08/23/86	3.1	4.0
08/31/86	3.1	3.2
09/25/86	3.4	5.2
10/12/86	2.7	9.3
MEAN	3.4	3.9
MAX	4.5	9.3
MIN	2.7	2.2
N	14	12
SD	0.50	2.03

TURTLE ROCK BAY

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/18/86	4.3	1.4
05/31/86	3.2	2.5
06/06/86	3.2	2.3
06/15/86	3.2	1.4
06/30/86	3.8	1.6
07/06/86	3.7	4.4
07/15/86	3.7	4.5
07/19/86	4.7	3.2
07/26/86	4.2	
08/03/86	4.4	1.7
08/23/86	4.1	3.4
08/31/86	3.7	3.2
09/25/86	3.7	4.5
10/12/86	2.4	7.5
MEAN	3.7	3.2
MAX	4.7	7.5
MIN	2.4	1.4
N	14	13
SD	0.60	1.73

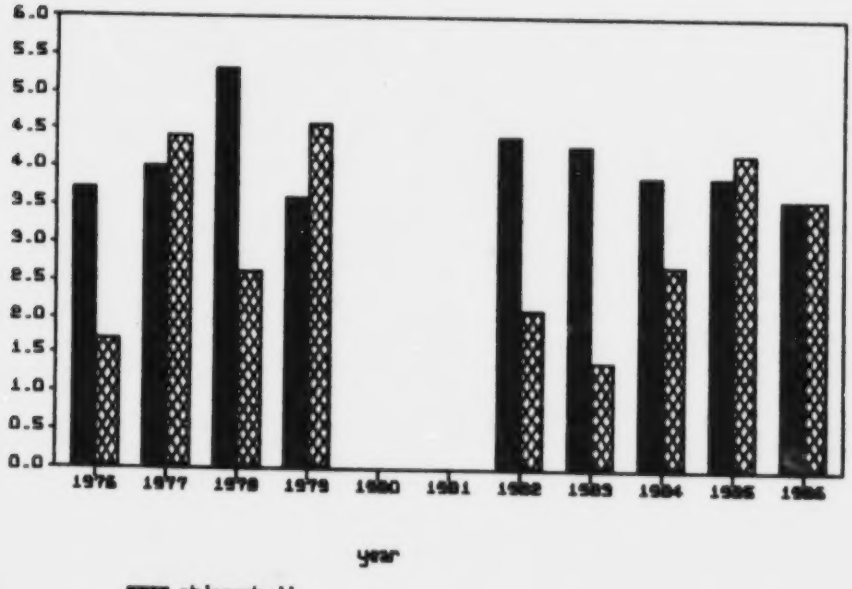
LAKE : LITTLE SILVER LAKE
TWP : SOUTH SHERBROOKE
COUNTY : LANARK

ID NUMBER : 18-0033-021-01

WATERSHED AREA	: 8.10	sq.km	SHORELINE	: 10.10 km.
SURFACE AREA	: 83.0	ha.	COTTAGES	: 31
MAX DEPTH	: 12.20	m.	RESORTS	: 0
VOLUME	: 3.82	mill cu. m.	% CROWN LAND	: 0

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1976 ‡	3.7	1.7
1977 ‡‡	4.0	4.4
1978	5.3	2.6
1979 ‡‡	3.6	4.6
1982	4.4	2.1
1983	4.3	1.4
1984	3.9	2.7
1985	3.9	4.2
1986	3.6	3.6
MEAN	4.0	3.0
MAX	5.3	4.6
MIN	3.6	1.4
N	9	9
SD	0.54	1.21

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



LOUGHBOROUGH LAKE

Loughborough Lake is divided into two distinct basins that act independently of each other from a water quality point of view. The east basin is shallow with a maximum depth of 6.8 metres, while the west basin is a long narrow trough with a depth of 38 metres. Shallow lakes are characteristically more productive of weeds and algae than are deep lakes. This is exemplified in Loughborough Lake by the higher chlorophyll concentrations and the lower Secchi disc visibility of the east basin compared to the west basin.

A good sampling program was carried out on the east basin during 1986 with a total of 18 observations of water quality between the middle of June and the beginning of November. The mean Secchi disc visibility depths and chlorophyll concentrations indicate good water clarity and the absence of nuisance levels of algae. Higher chlorophyll concentrations in 1985 and 1986 compared with the earlier seasonal average record are the result of improved recovery and detection of chlorophyll in lake water by an improvement to the analytical procedure for chlorophyll introduced by the laboratory in 1985.

Fewer samples were collected from the west basin but sampling was adequate to demonstrate continuing excellent water quality in the west basin. The mean Secchi disc depth visibility has been greater than 5 metres in the west basin of Loughborough Lake since 1981.

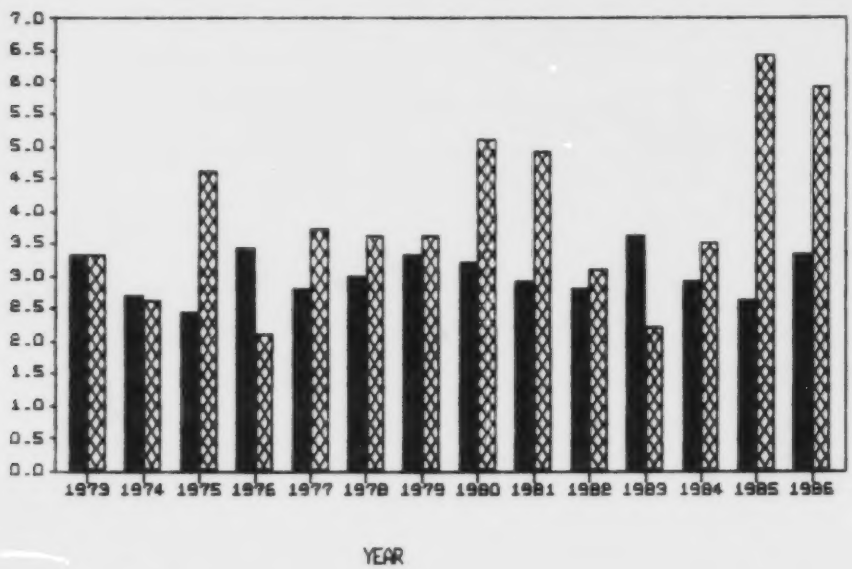
LAKE : LOUGHBOROUGH LAKE : EAST BASIN ID NUMBER : 12-0004-014-01
TWP : STORRINGTON, LOUGHBOROUGH
COUNTY : FRONTENAC

WATERSHED AREA	: 120.00	sq.km	SHORELINE	: 72.40 km.
SURFACE AREA	: 1065.0	ha.	COTTAGES	: 240 + 10 HOUSES
MAX DEPTH	: 6.10	m.	RESORTS	: 2 (74)
VOLUME	: 22.08	mill cu. m.	% CROWN LAND	: 0

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/15/86	3.7	6.5
06/24/86	3.4	3.0
07/07/86	6.4	14.2
07/15/86	2.7	5.4
07/25/86	3.8	4.2
07/27/86	3.7	5.6
08/05/86	2.4	9.2
08/13/86	2.4	7.6
08/20/86	3.5	5.3
08/27/86	2.4	4.9
09/03/86	2.9	4.2
09/14/86	3.2	5.8
09/21/86	3.5	4.8
10/01/86	3.1	4.8
10/13/86	3.2	6.2
10/20/86	3.4	5.2
10/28/86	3.1	3.8
11/06/86	2.7	
MEAN	3.3	5.9
MAX	6.4	14.2
MIN	2.4	3.0
N	18	17
SD	0.90	2.58

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1973 ‡	3.3	3.3
1974	2.7	2.6
1975 ‡‡	2.4	4.6
1976	3.4	2.1
1977	2.8	3.7
1978	3.0	3.6
1979	3.3	3.6
1980	3.2	5.1
1981	2.9	4.9
1982	2.8	3.1
1983	3.6	2.2
1984	2.9	3.5
1985	2.6	6.4
1986	3.3	5.9
MEAN	3.0	3.9
MAX	3.6	6.4
MIN	2.4	2.1
N	14	14
SD	0.34	1.31

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



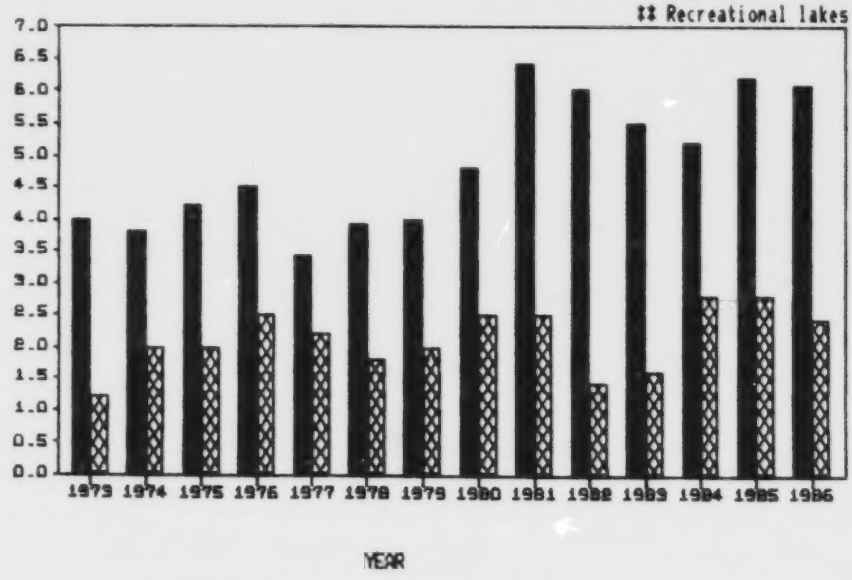
LAKE : LOUGHBOROUGH LAKE : WEST BASIN ID NUMBER : 12-0004-015-01
TWP : STORRINGTON, LOUGHBOROUGH
COUNTY : FRONTENAC

WATERSHED AREA	: 58.00	sq.km	SHORELINE	: 28.70 km.	
SURFACE AREA	: 738.0	ha.	COTTAGES	: 138 + 13 HOUSES	
MAX DEPTH	: 38.40	m.	RESORTS	: 3 (187)	
VOLUME	: 107.13	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/01/86	7.6	1.2
07/27/86	5.3	2.6
08/10/86	6.1	3.1
08/19/86	6.1	2.9
09/03/86	6.3	1.8
09/21/86	5.5	3.0
MEAN	6.1	2.4
MAX	7.6	3.1
MIN	5.3	1.2
N	6	6
SD	0.81	0.77

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1973 ‡	4.0	1.2
1974 ‡	3.8	2.0
1975 ‡‡	4.2	2.0
1976	4.5	2.5
1977	3.4	2.2
1978	3.9	1.8
1979	4.0	2.0
1980	4.8	2.5
1981 ‡‡	6.4	2.5
1982	6.0	1.4
1983	5.5	1.6
1984 ‡	5.2	2.8
1985 ‡	6.2	2.8
1986	6.1	2.4
MEAN	4.8	2.1
MAX	6.4	2.8
MIN	3.4	1.2
N	14	14
SD	1.03	0.50

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



LOWER BEVERLY LAKE

Good seasonal coverage was provided by nine samples taken between May 25 and September 1. Chlorophyll concentrations increased and water clarity decreased as the summer progressed. Concentrations of chlorophyll during August were high but there were no complaints about water quality to the Ministry of the Environment. In the absence of complaints about water quality it is concluded that these levels are not altogether atypical of Lower Beverly Lake and that they do not represent nuisance conditions. The higher concentrations reported for 1986 and 1985 are largely due to better recovery and detection of chlorophyll from lake samples by an improvement to the analytical procedure for chlorophyll introduced by the laboratory in 1985.

LAKE : LOWER BEVERLEY LAKE
TWP : SOUTH CROSBY, BASTARD
COUNTY : LEEDS

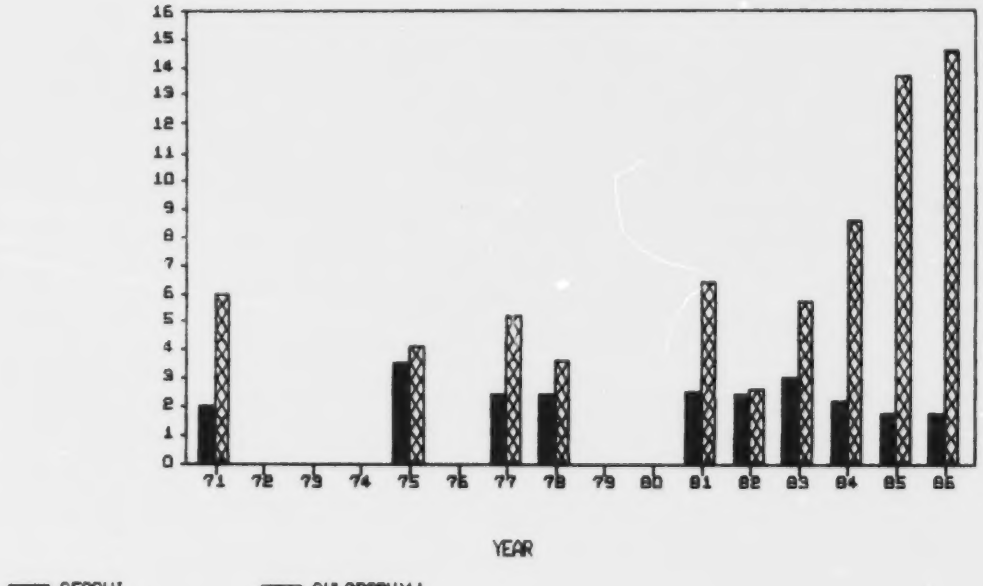
ID NUMBER : 12-0017-012-01

WATERSHED AREA	: 281.80	sq.km	SHORELINE	: 44.00 km.
SURFACE AREA	: 766.0	ha.	COTTAGES	: 247 + 13 HOMES
MAX DEPTH	: 25.90	m.	RESORTS	: 4 (272)
VOLUME	: 70.2	mill cu. m.	% CROWN LAND	: 0

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/25/86	2.1	1.6
06/15/86	2.1	5.0
07/01/86	1.8	7.2
07/06/86	2.0	11.1
07/16/86	1.8	8.0
07/27/86	1.5	16.2
08/04/86	1.5	28.6
08/14/86	1.4	27.3
09/01/86	1.5	27.0
MEAN	1.7	14.6
MAX	2.1	28.6
MIN	1.4	1.6
N	9	9
SD	0.28	10.52

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1971 ‡‡	2.0	6.0
1975 ‡‡	3.5	4.1
1977	2.4	5.2
1978	2.4	3.6
1981	2.5	6.4
1982 ‡‡	2.4	2.6
1983 ‡‡	3.0	5.7
1984 ‡‡	2.2	8.6
1985	1.7	13.6
1986	1.7	14.6
MEAN	2.3	7.0
MAX	3.5	14.6
MIN	1.7	2.6
N	10	10
SD	0.55	4.08

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



MAZINAW LAKE

Reasonably good seasonal coverage of water quality conditions in Mazinaw lake was provided by two separate sampling programs. There was no evidence of any seasonal variability in water clarity or chlorophyll concentrations. The higher water clarity readings at Hungry Bay may be as much a subjective difference in interpreting Secchi disc visibility as a reflection of better water clarity.

The results at both locations show that Mazinaw Lake has excellent water quality.

With respect to the historical record, water clarity appears to have declined since 1978. There has been no corresponding increase in chlorophyll concentration to account for the apparent decline in water clarity. Higher chlorophyll concentrations in 1985 and 1986 are the result of better recovery and detection of chlorophyll as a result of an improved analytical procedure introduced by the laboratory in 1985.

The Bon Echo Provincial Park was presented a plaque at a Self Help Program awards ceremony for their 10 or more years record of water quality sampling on Mazinaw and Joeperry Lakes.

LAKE : MAZINAW LAKE
TWP : ABINGER, BARRIE
COUNTY : FRONTENAC, LENNOX & ADDINGTON

ID NUMBER : 18-3430-011-01

WATERSHED AREA	: 137.85	sq.km	SHORELINE	: 49.10 km.
SURFACE AREA	: 1590.0	ha.	COTTAGES	: 254 (1972)
MAX DEPTH	: 144.80	m.	RESORTS	: 2(47), 5(765)
VOLUME	: 655.00	mill cu. m.	% CROWN LAND	: 50

NEAR HUNGRY BAY

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/01/86	3.9	1.3
07/13/86	4.3	1.1
07/29/86	4.6	1.5
08/11/86	4.3	2.5
08/21/86	4.2	1.5
08/28/86	5.2	1.3
09/01/86	4.6	1.4
MEAN	4.4	1.5
MAX	5.2	2.5
MIN	3.9	1.1
N	7	7
SD	0.41	0.46

BON ECHO PROVINCIAL PARK

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/19/86	3.7	1.4
06/26/86	2.7	3.3
07/10/86	2.4	1.9
07/17/86	3.9	1.6
07/24/86	3.7	1.8
07/31/86	3.4	1.6
08/07/86	3.1	1.5
08/14/86	3.4	1.8
08/21/86	3.1	1.7
08/28/86	3.1	1.7
MEAN	3.2	1.8
MAX	3.9	3.3
MIN	2.4	1.4
N	10	10
SD	0.47	0.54

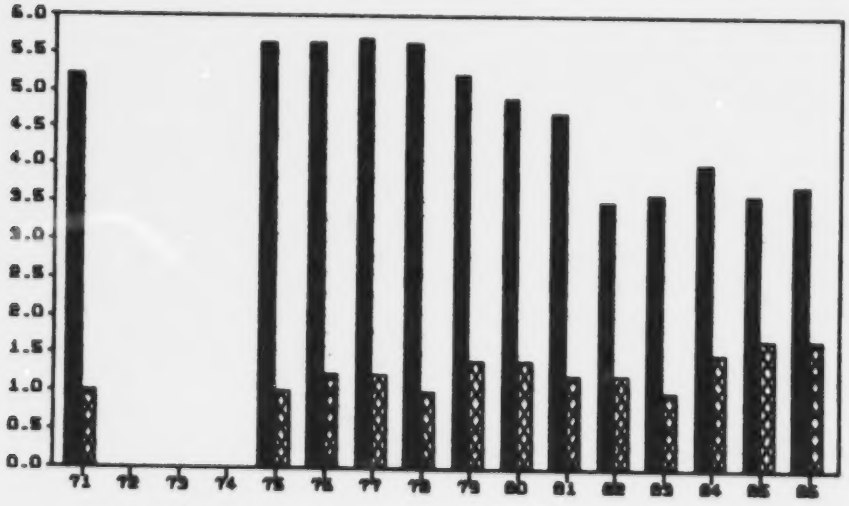
LAKE : MAZINAW LAKE
TWP : ABINGER, BARRIE
COUNTY : FRONTENAC, LENNOX & ADDINGTON

ID NUMBER : 18-3430-011-01

WATERSHED AREA	:	137.85	sq.km	SHORELINE	: 49.10 km.
SURFACE AREA	:	1590.0	ha.	COTTAGES	: 254 (1972)
MAX DEPTH	:	144.80	m.	RESORTS	: 2(47), 5(765)
VOLUME	:	655.00	mill cu. m.	% CROWN LAND	: 50

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1971 ‡‡	5.2	1.0
1975	5.6	1.0
1976	5.6	1.2
1977	5.7	1.2
1978	5.6	1.0
1979	5.2	1.4
1980	4.9	1.4
1981	4.7	1.2
1982	3.5	1.2
1983 ‡	3.6	1.0
1984	4.0	1.5
1985	3.6	1.7
1986	3.7	1.7
MEAN	4.6	1.2
MAX	5.7	1.7
MIN	3.5	1.0
N	13	13
SD	0.88	0.25

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



MCKAY LAKE

Mckay Lake and The Pond are two small urban water bodies located in Rockcliffe Park at Ottawa.

Episodically high chlorophyll concentrations of 11.3 ug/L on July 1 and 37.3 ug/L on July 23 contributed to a high seasonal mean value of 10.0 ug/L for Mckay Lake during 1986. Chlorophyll concentrations in The Pond, a contiguous water body, were lower and not subject to such extremes. Water clarity in both basins was good.

The occurrence of extremely high peak chlorophyll concentrations in some years influences the seasonal means and makes interpretation of the historical record difficult.

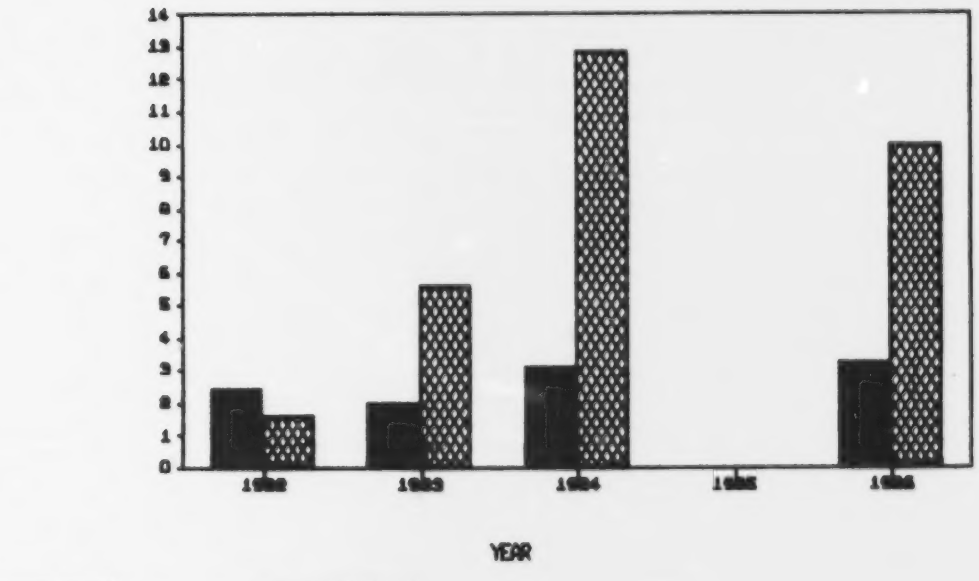
LAKE : MCKAY LAKE ID NUMBER : 18-0000-004-01
TWP : GLOUSTER, VILLAGE OF ROCKLIFFE PARK
COUNTY : REGIONAL MUNICIPALITY OF OTTAWA-CARLETON

WATERSHED AREA	:	sq.km	SHORELINE	:	km.
SURFACE AREA	:	ha.	COTTAGES	: 0	
MAX DEPTH	:	m.	RESORTS	: 0	
VOLUME	:	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/01/86	3.6	11.2
07/09/86	3.2	3.0
07/16/86	3.0	4.3
07/23/86	3.9	37.3
07/31/86	3.3	5.4
08/06/86	3.2	5.6
09/01/86	2.8	3.4
MEAN	3.2	10.0
MAX	3.9	37.3
MIN	2.8	3.0
N	7	7
SD	0.37	12.33

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1982	2.4	1.6
1983	2.0	5.6
1984 ‡	3.1	12.8
1986	3.2	10.0
MEAN	2.6	7.5
MAX	3.2	12.8
MIN	2.0	1.6
N	4	4
SD	0.57	4.92

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



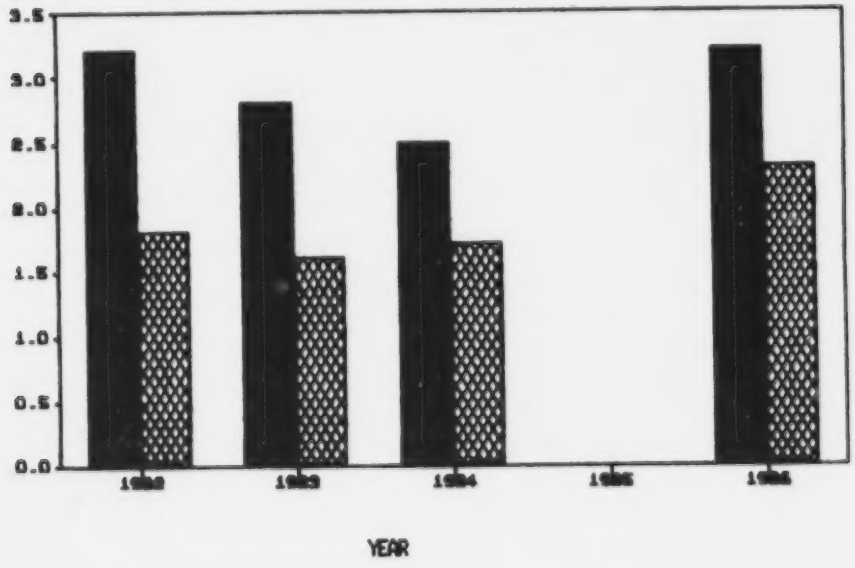
LAKE : MCKAY LAKE : THE POND ID NUMBER : 18-0000-005-01
TWP : GLOUSTER, VILLAGE OF ROCKLIFFE PARK
COUNTY : REGIONAL MUNICIPALITY OF OTTAWA-CARLETON

WATERSHED AREA	:	sq.km	SHORELINE	:	km.
SURFACE AREA	:	ha.	COTTAGES	: 0	
MAX DEPTH	:	m.	RESORTS	: 0	
VOLUME	:	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/02/86	3.7	2.8
07/09/86	3.2	2.3
07/16/86	3.3	2.3
07/23/86	3.1	1.4
07/31/86	3.0	3.5
08/06/86	3.0	1.8
09/01/86	3.5	2.0
MEAN	3.2	2.3
MAX	3.7	3.5
MIN	3.0	1.4
N	7	7
SD	0.26	0.69

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1982	3.2	1.8
1983	2.8	1.6
1984 ‡	2.5	1.7
1986	3.2	2.3
MEAN	2.9	1.8
MAX	3.2	2.3
MIN	2.5	1.6
N	4	4
SD	0.34	0.31

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



MINK LAKE

Insufficient sampling was carried out during 1986 to obtain any meaningful results. A minimum of six sets of measurements each year is required to adequately characterize the water quality of a lake. Twelve or more samples evenly timed from May until October are preferable in order to define any seasonal trends if they are present.

The historical record indicates Mink Lake has good water quality with no problems related to excessive algae.

A presentation of an awards plaque was made to Mr. J. Simpson in recognition of the 10 year record of participation by the Mink Lake Betterment Association in the Self Help Program.

LAKE : MINK LAKE
TWP : WILBERFORCE
COUNTY : RENFREW

ID NUMBER : 18-3690-006-01

WATERSHED AREA	: 40.20	sq.km	SHORELINE	:	km.
SURFACE AREA	: 556.0	ha.	COTTAGES	: 119	
MAX DEPTH	: 13.70	m.	RESORTS	: 2 (102)	
VOLUME	: 72.3	mill cu. m.	% CROWN LAND	: 0	

OFF BOY'S AND GIRL'S CAMP

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
08/07/86	3.2	1.8
08/31/86	3.7	1.8
MEAN	3.4	1.8
MAX	3.7	1.8
MIN	3.2	1.8
N	2	2
SD	0.35	

OFF ISLAND

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
08/07/86	3.7	1.9
08/31/86	3.6	1.7
MEAN	3.6	1.8
MAX	3.7	1.9
MIN	3.6	1.7
N	2	2
SD	0.07	0.14

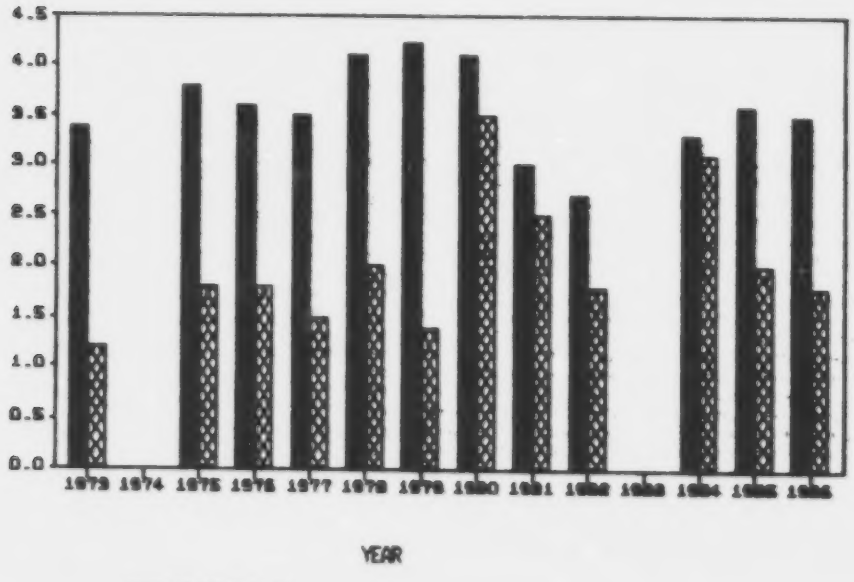
LAKE : MINK LAKE
TWP : WILBERFORCE
COUNTY : RENFREW

ID NUMBER : 18-3690-006-01

WATERSHED AREA	: 40.20	sq.km	SHORELINE	:	km.
SURFACE AREA	: 556.0	ha.	COTTAGES	: 119	
MAX DEPTH	: 13.70	m.	RESORTS	: 2 (102)	
VOLUME	: 72.3	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1973 *	3.4	1.2
1975	3.8	1.8
1976	3.6	1.8
1977	3.5	1.5
1978 **	4.1	2.0
1979	4.2	1.4
1980	4.1	3.5
1981	3.0	2.5
1982 *	2.7	1.8
1984 **	3.3	3.1
1985 **	3.6	2.0
1986 *	3.5	1.8
MEAN	3.5	2.0
MAX	4.2	3.5
MIN	2.7	1.2
N	12	12
SD	0.45	0.68

NOTE : * Based on less then 6 readings.
** Recreational lakes included.



MISSISSIPPI LAKE

A good sampling program was carried out on Mississippi Lake with 10 samples taken between June 24 and September 8. Only First Lake was sampled during 1986. Other locations on Mississippi Lake have been sampled, although not continuously, since 1972. The results for all locations indicate that Mississippi Lake has good water quality.

Mississippi Lake is under consideration by the Ministry of Natural Resources for a shoreline restoration program. The shoreline restoration program involves lake organizations in actively participating in the reintroduction of natural shoreline vegetation for the purpose of improving the lake environment.

Mr. W. H. Johnson was presented a plaque for his participation and that of other members of the Mississippi Lakes Association for 10 or more years in the Self Help Program. The presentation was made at an awards ceremony held in Kingston on September 19, 1986.

LAKE : MISSISSIPPI LAKE
TWP : DRUMMOND, BECKWITH, RAMSAY
COUNTY : LANARK

ID NUMBER : 18-3430-014-01

WATERSHED AREA	: 2900.00	sq.km	SHORELINE	: 58.00	km.
SURFACE AREA	: 2346.0	ha.	COTTAGES	: 1278	
MAX DEPTH	: 9.20	m.	RESORTS	: 16 (1121)	
VOLUME	: 64.33	mill cu. m.	% CROWN LAND	: 0	

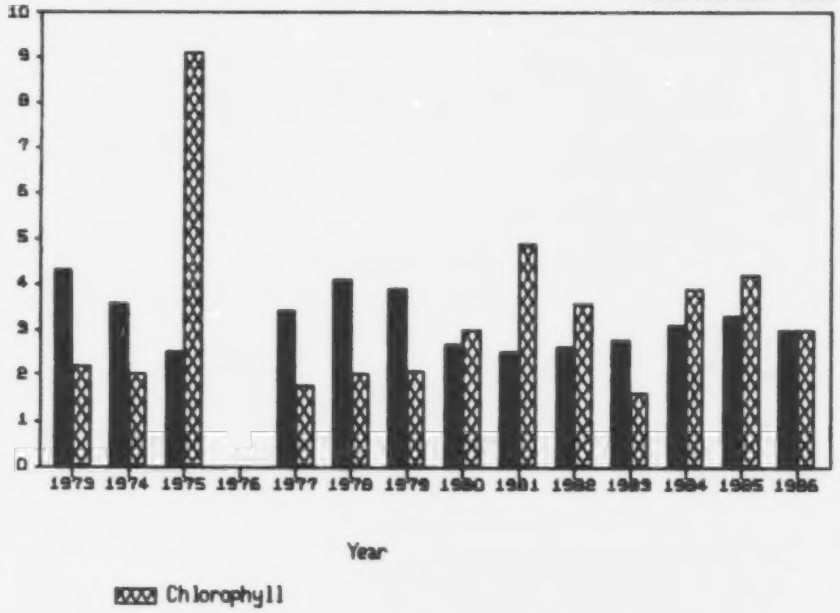
FIRST LAKE

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/24/86	2.7	7.3
07/02/86	3.0	4.0
07/08/86	3.3	2.2
07/14/86	3.0	1.6
08/06/86	3.1	2.8
08/11/86	3.1	2.9
08/18/86	3.1	2.2
08/27/86	3.1	3.6
09/03/86	2.9	2.5
09/08/86	2.7	1.8
MEAN	3.0	3.0
MAX	3.3	7.3
MIN	2.7	1.6
N	10	10
SD	0.19	1.66

VARIOUS LOCATIONS

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1973	4.3	2.2
1974	3.6	2.0
1975 ‡‡	2.5	9.1
1977	3.4	1.8
1978	4.1	2.0
1979	3.9	2.1
1980	2.7	3.0
1981	2.5	4.9
1982	2.6	3.6
1983	2.8	1.6
1984	3.1	3.9
1985	3.3	4.2
1986	3.0	3.0
MEAN	3.2	3.3
MAX	4.3	9.1
MIN	2.5	1.6
N	13	13
SD	0.61	2.02

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



MOIRA LAKE

There has been a long history of water quality investigations of Moira Lake dating back to 1960 with major surveys in 1964, 1967 and 1972 to 1975. These investigations have established that Moira Lake is naturally eutrophic and supports abundant growths of aquatic weeds and high levels of algae.

A good sampling program was carried out on both the east and west basins of Moira Lake during 1986 with sampling from June through to September. The results show a seasonal increase in chlorophyll levels with peak concentrations occurring during August. While chlorophyll concentrations during August were high, the lack of any complaints about water quality conditions would tend to indicate the concentrations did not represent nuisance levels of algae for Moira Lake.

There appears to have been a lasting improvement in water quality of the west basin since 1973 when sewage treatment facilities serving the Village of Madoc were upgraded. Sewage is discharged to the west basin via Deer Creek. Discharge is in the spring and fall before and after the growing season for aquatic plants, respectively.

LAKE : MOIRA LAKE : EAST BASIN ID NUMBER : 17-0026-002-01
TWP : HUNTINGTON
COUNTY : HASTINGS

WATERSHED AREA	: 596.00	sq.km	SHORELINE	: 14.70	km.
SURFACE AREA	: 611.0	ha.	COTTAGES	:	
MAX DEPTH	: 11.00	m.	RESORTS	:	
VOLUME	:	mill cu. m.	% CROWN LAND	: 0	

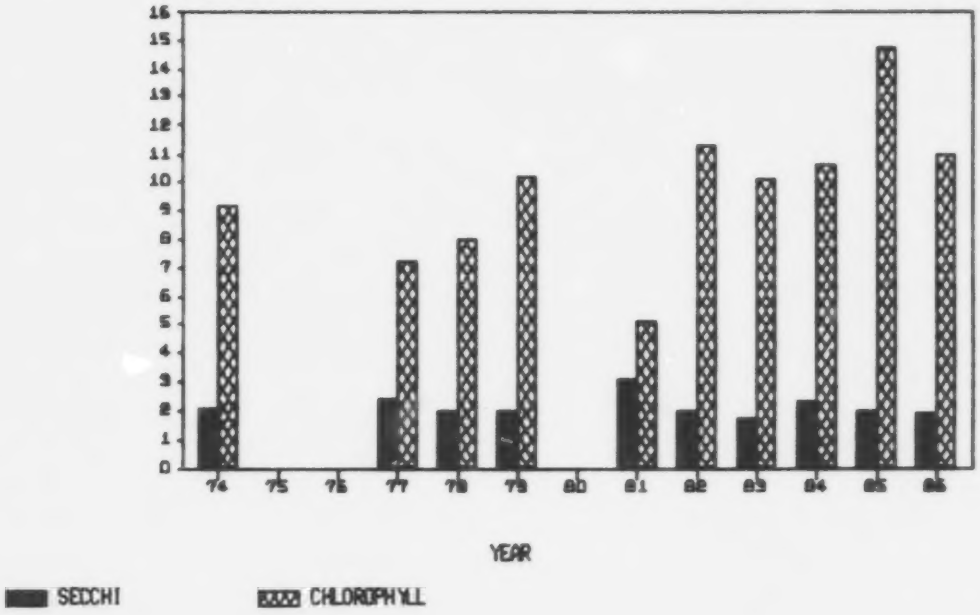
EAST BASIN

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/08/86	3.1	6.4
06/15/86	3.1	6.6
06/21/86	2.4	8.4
06/28/86	2.1	7.6
07/11/86	2.1	6.3
07/16/86	1.8	8.6
07/24/86	1.7	8.7
08/01/86	1.5	11.8
08/10/86	1.5	17.0
08/17/86	1.4	17.3
08/29/86	1.2	16.5
09/14/86	1.7	17.4
MEAN	1.9	11.0
MAX	3.1	17.4
MIN	1.2	6.3
N	12	12
SD	0.63	4.67

EAST BASIN

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1974	2.1	9.2
1977	2.4	7.2
1978	2.0	8.0
1979 ‡	2.0	10.2
1981	3.1	5.1
1982	2.0	11.3
1983	1.8	10.1
1984	2.3	10.6
1985	2.0	14.7
1986	1.9	11.0
MEAN	2.1	9.7
MAX	3.1	14.7
MIN	1.8	5.1
N	10	10
SD	0.37	2.60

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



LAKE : MOIRA LAKE : WEST BASIN
TWP : HUNTINGTON
COUNTY : HASTINGS

ID NUMBER : 17-0026-003-01

WATERSHED AREA	: 546.00	sq.km	SHORELINE	: 9.30	km.
SURFACE AREA	: 216.0	ha.	COTTAGES	: 64 (1972)	
MAX DEPTH	: 7.30	m.	RESORTS	:	
VOLUME	: 7.47	mill cu. m.	% CROWN LAND	: 0	

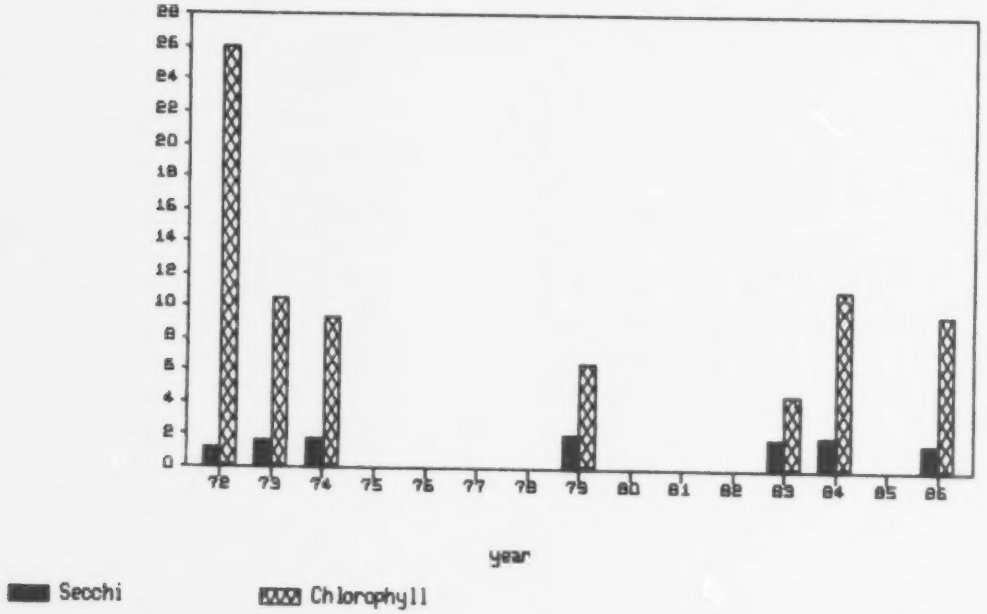
WEST BASIN

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/17/86	1.7	9.0
06/26/86	1.4	8.8
07/03/86	2.0	9.1
07/10/86	1.9	9.3
07/18/86	1.7	6.0
07/30/86	2.0	8.6
08/08/86	1.4	11.9
08/14/86	1.1	6.0
08/25/86	1.4	18.6
09/15/86	1.4	15.8
09/24/86	1.7	6.7
10/01/86	1.4	5.2
MEAN	1.5	9.5
MAX	2.0	18.6
MIN	1.1	5.2
N	12	12
SD	0.28	4.05

WEST BASIN

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1972 ‡‡	1.1	26.0
1973 ‡‡	1.6	10.4
1974	1.7	9.2
1979	1.9	6.5
1983	1.8	4.6
1984	2.0	11.0
1986	1.5	9.5
MEAN	1.6	11.0
MAX	2.0	26.0
MIN	1.1	4.6
N	7	7
SD	0.30	6.98

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



MOSQUE LAKE

Six sets of samples were collected from each of three locations on Mosque Lake from June 11 to October 10.

The west basin of Mosque Lake had higher chlorophyll concentrations and less water clarity than the north and south basins reflecting a higher level of productivity in the west basin than in the main lake. This higher level of productivity in the west basin is a characteristic feature of Mosque Lake based on the historical record.

The results from all three sampling locations indicate Mosque Lake has good water quality.

Mr. J. O'Dette was presented a plaque at an awards ceremony on September 19, 1986 for a 10 year record of participation in the Self Help Program.

LAKE : MOSQUE LAKE
TWP : MILLER, CLARENDON
COUNTY : FRONTENAC

ID NUMBER : 18-3430-017-01

WATERSHED AREA	: 6.21	sq.km	SHORELINE	: 13.20 km.
SURFACE AREA	: 138.0	ha.	COTTAGES	: 43
MAX DEPTH	: 34.10	m.	RESORTS	: 1 (3)
VOLUME	: 9.7	mill cu. m.	% CROWN LAND	: 65

NORTH BASIN

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/11/86	5.2	
07/11/86	4.9	1.7
07/27/86	4.6	1.7
08/18/86	4.6	
09/01/86	4.1	2.4
10/10/86	4.0	1.6
MEAN	4.5	1.8
MAX	5.2	2.4
MIN	4.0	1.6
N	6	4
SD	0.46	0.37

SOUTH BASIN

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/11/86	5.2	
07/11/86	3.9	3.3
07/27/86	4.9	1.9
08/18/86	4.6	
09/01/86	4.3	2.7
10/10/86	4.3	1.2
MEAN	4.5	2.2
MAX	5.2	3.3
MIN	3.9	1.2
N	6	4
SD	0.47	0.92

LAKE : MOSQUE LAKE
TWP : MILLER, CLARENDON
COUNTY : FRONTENAC

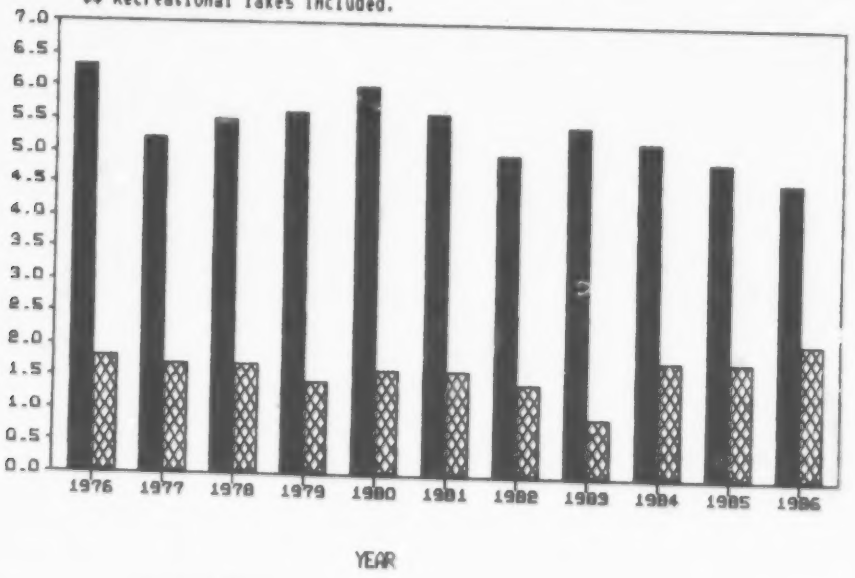
ID NUMBER : 18-3430-017-01

WATERSHED AREA	: 6.21	sq.km	SHORELINE	: 13.20 km.
SURFACE AREA	: 138.0	ha.	COTTAGES	: 43
MAX DEPTH	: 34.10	m.	RESORTS	: 1 (3)
VOLUME	: 9.7	mill cu. m.	% CROWN LAND	: 65

NORTH & SOUTH BASINS COMBINED

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1976 ‡‡	6.3	1.8
1977	5.2	1.7
1978	5.5	1.7
1979	5.6	1.4
1980 ‡‡	6.0	1.6
1981	5.6	1.6
1982	5.0	1.4
1983	5.4	0.9
1984	5.2	1.8
1985	4.9	1.8
1986	4.6	2.1
MEAN	5.3	1.6
MAX	6.3	2.1
MIN	4.6	0.9
N	11	11
SD	0.49	0.31

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



LAKE : MOSQUE LAKE
TWP : MILLER, CLARENDON
COUNTY : FRONTENAC

ID NUMBER : 18-3430-017-01

WATERSHED AREA	: 6.21	sq.km	SHORELINE	: 13.20	km.
SURFACE AREA	: 138.0	ha.	COTTAGES	: 43	
MAX DEPTH	: 34.10	m.	RESORTS	: 1 (3)	
VOLUME	: 9.7	mill cu. m.	% CROWN LAND	: 65	

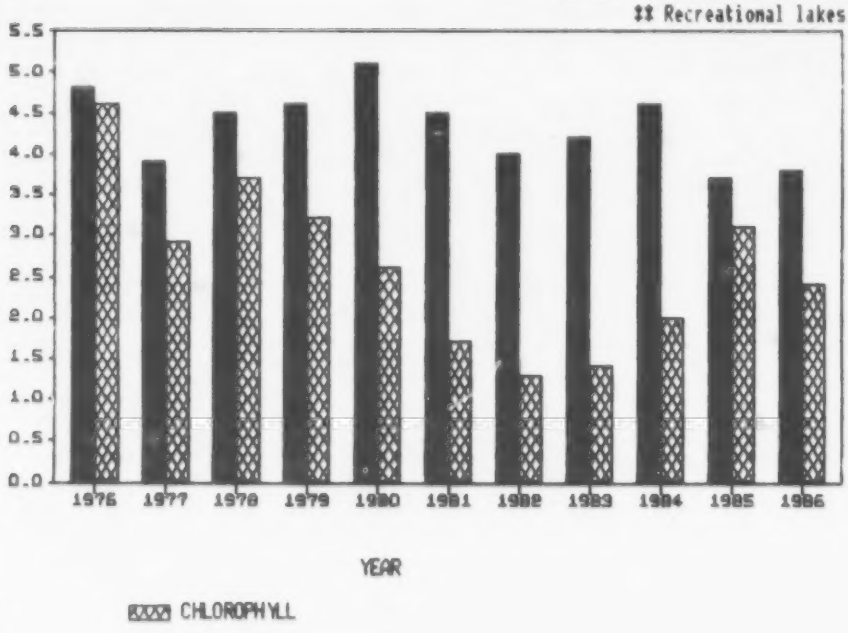
WEST BASIN

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/11/86	4.0	
07/11/86	4.5	1.6
07/27/86	3.4	3.1
08/18/86	4.0	1.9
09/01/86	3.8	4.1
10/10/86	3.4	1.7
MEAN	3.8	2.4
MAX	4.5	4.1
MIN	3.4	1.6
N	6	5
SD	0.42	1.09

WEST BASIN

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1976 ‡‡	4.8	4.6
1977	3.9	2.9
1978	4.5	3.7
1979	4.6	3.2
1980 ‡	5.1	2.6
1981	4.5	1.7
1982	4.0	1.3
1983	4.2	1.4
1984	4.6	2.0
1985	3.7	3.1
1986	3.8	2.4
MEAN	4.3	2.6
MAX	5.1	4.6
MIN	3.7	1.3
N	11	11
SD	0.45	1.01

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



MUSKRAT LAKE

A good sampling program was carried out on Muskrat Lake during 1986 with sampling on 10 occasions from July 1 to September 3. While the presence or absence of a spring peak in chlorophyll cannot be confirmed, the results clearly show a considerable increase in concentrations during August.

Higher concentrations of chlorophyll detected during 1986 than in recent years are due in part due to an improved analytical procedure for the recovery and detection of chlorophyll introduced in 1985 and in part are due to the unusually wet weather experienced during the summer. The unusually wet summer resulted in more than the usual amounts of phosphorus and nitrogen entering lakes in runoff.

The historical record continues to indicate a lasting improvement in water quality conditions in Muskrat Lake since improvements to the sewage treatment process at the Village of Cobden in 1981 and other efforts to reduce nutrient inputs to Muskrat Lake.

LAKE : MUSKRAT LAKE
TWP : WESTMEATH, ROSS
COUNTY : RENFREW

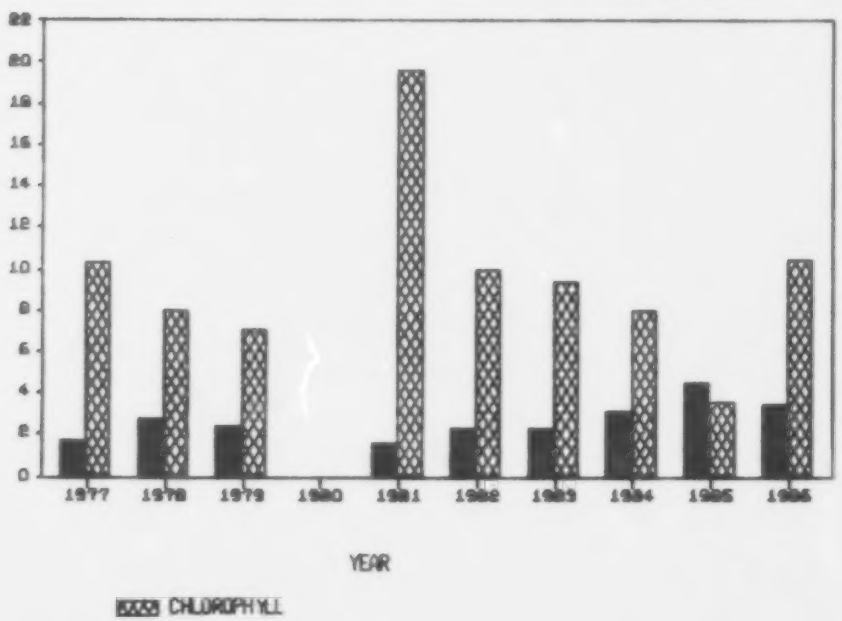
ID NUMBER : 18-4810-002-01

WATERSHED AREA	: 481.00	sq.km	SHORELINE	: 34.00 km.	
SURFACE AREA	: 1202.0	ha.	COTTAGES	: 132 + 21 HOUSES	
MAX DEPTH	: 64.00	m.	RESORTS	: 5 (357)	
VOLUME	: 213.2	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/01/86	3.2	5.2
07/08/86	2.9	3.2
07/16/86	3.8	6.2
07/22/86	4.6	3.3
07/31/86	4.3	4.4
08/06/86	3.5	4.8
08/12/86	3.7	9.5
08/20/86	2.9	18.5
08/26/86	2.9	21.8
09/03/86	2.6	27.3
MEAN	3.4	10.4
MAX	4.6	27.3
MIN	2.6	3.2
N	10	10
SD	0.66	8.80

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1977	1.7	10.3
1978 ‡‡	2.8	8.0
1979	2.4	7.1
1981	1.6	19.6
1982 ‡‡	2.3	9.9
1983	2.3	9.3
1984	3.1	8.0
1985	4.4	3.5
1986	3.4	10.4
MEAN	2.6	9.5
MAX	4.4	19.6
MIN	1.6	3.5
N	9	9
SD	0.88	4.33

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



NORWAY LAKE

Insufficient sampling was carried out to obtain any meaningful results. A minimum of six sets of measurements is necessary to adequately characterize water quality of a lake. Ideally 12 or more samples evenly timed throughout the ice free season from May until October should be collected to define any seasonal trends if they are present.

There has been insufficient sampling in previous years as well as during 1986 to comment on trend through time. The record would appear to indicate that conditions are stable in Norway Lake and that water quality is very good.

LAKE : NORWAY LAKE
TWP : BAGOT, BLYTHFIELD
COUNTY : RENFREW

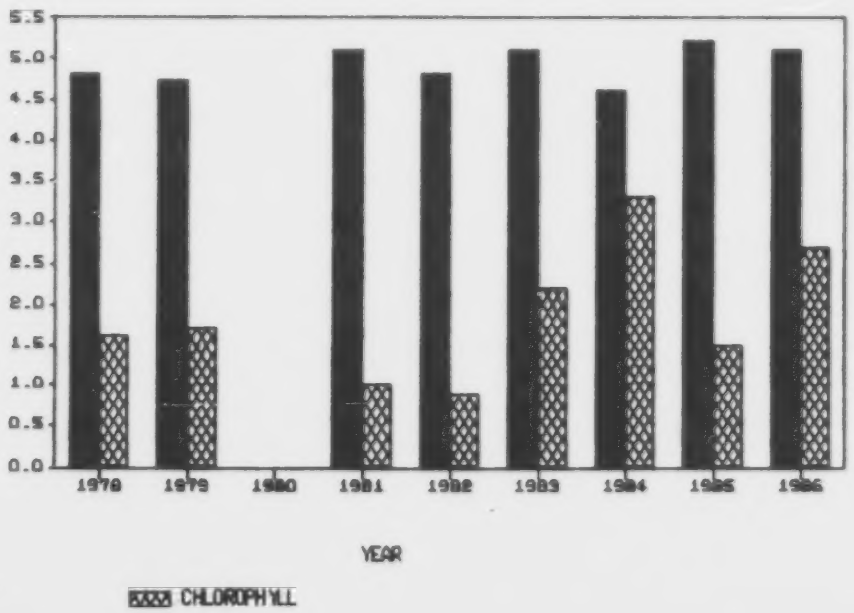
ID NUMBER : 18-3490-028-01

WATERSHED AREA	: 14.40	sq.km	SHORELINE	: 12.90	km.
SURFACE AREA	: 271.0	ha.	COTTAGES	: 124	
MAX DEPTH	: 36.60	m.	RESORTS	: 0	
VOLUME	: 25.38	mill cu. m.	% CROWN LAND	: 99	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/15/86	5.8	1.4
07/28/86	4.9	3.1
09/14/86	4.6	3.7
MEAN	5.1	2.7
MAX	5.8	3.7
MIN	4.6	1.4
N	3	3
SD	0.62	1.19

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1978 ‡‡	4.8	1.6
1979	4.7	1.7
1981 ‡	5.1	1.0
1982 ‡	4.8	0.9
1983	5.1	2.2
1984 ‡	4.6	3.3
1985 ‡	5.2	1.5
1986 ‡	5.1	2.7
1986 ‡	5.1	2.7
MEAN	4.9	1.9
MAX	5.2	3.3
MIN	4.6	0.9
N	9	9
SD	0.22	0.82

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



OPINICON LAKE

An excellent sampling program was carried out on Opincion Lake with 21 samples collected from May 18 to October 21. Concentrations of chlorophyll generally increased as the summer progressed peaking during August and September. Concentrations then declined towards the end of the season.

Chlorophyll concentrations were higher during 1986 than in previous years. This is partly a result of a change in the analytical procedure for chlorophyll and partly a result of the unusually wet weather experienced during the summer. An improvement in the analytical procedure for chlorophyll was introduced by the laboratory in 1985 since it was discovered that the new procedure improves the recovery and detection of chlorophyll from lake samples. It is believed that the wet weather experienced during the summer resulted in more phosphorus and nitrogen entering lakes in rainfall and runoff than normal which produced more algae.

The higher concentrations of chlorophyll do not reflect nuisance levels of algae and the water clarity of Opinicon Lake is very good with a mean Secchi disc visibility depth of greater than three metres for most years.

LAKE : OPINICON LAKE
TWP : BEDFORD, SOUTH CROSBY, STORRINGTON
COUNTY : FRONTENAC, LEEDS

ID NUMBER : 12-0004-016-01

WATERSHED AREA	: 580.00	sq.km	SHORELINE	: 52.00 km.
SURFACE AREA	: 785.0	ha.	COTTAGES	: 120 (1971)
MAX DEPTH	: 9.15	m.	RESORTS	: 6 (104)
VOLUME	: 38.61	mill cu. m.	% CROWN LAND	: 0

BETWEEN SNAKE & HUCKLEBERRY ISLANDS

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/18/86	3.7	1.4
05/25/86	4.2	1.3
06/08/86	3.1	4.9
06/15/86	3.4	4.2
06/22/86	2.9	3.6
06/29/86	2.9	4.8
07/06/86	3.3	3.6
07/15/86	4.1	2.8
07/20/86	3.2	3.4
07/27/86	3.5	2.7
08/04/86	3.5	4.6
08/10/86	2.6	11.0
08/17/86	2.6	10.0
08/26/86	2.3	9.7
09/01/86	2.7	8.3
09/07/86	2.9	4.5
09/14/86	2.3	10.5
09/21/86	3.2	4.8
09/28/86	3.2	4.4
10/05/86	3.2	3.3
10/12/86	3.4	4.0
MEAN	3.1	5.1
MAX	4.2	11.0
MIN	2.3	1.3
N	21	21
SD	0.51	2.94

VARIOUS OPEN WATER LOCATIONS

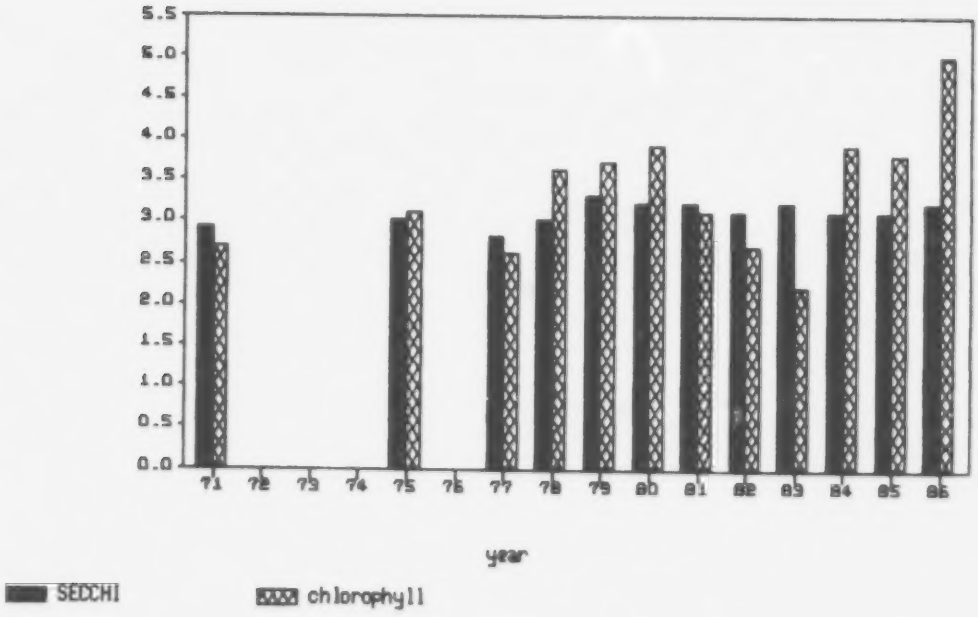
SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1971 ‡‡	2.9	2.7
1975 ‡‡	3.0	3.1
1977	2.8	2.6
1978	3.0	3.6
1979	3.3	3.7
1980	3.2	3.9
1981	3.2	3.1
1982	3.1	2.7
1983	3.2	2.2
1984	3.1	3.9
1985	3.1	3.8
1986	3.1	5.1
MEAN	3.0	3.3
MAX	3.3	5.1
MIN	2.8	2.2
N	12	12
SD	0.14	0.79

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.

LAKE : OPINICON LAKE
TWP : BEDFORD, SOUTH CROSBY, STORRINGTON
COUNTY : FRONTENAC, LEEDS

ID NUMBER : 12-0004-016-01

WATERSHED AREA	: 580.00	sq.km	SHORELINE	: 52.00 km.
SURFACE AREA	: 785.0	ha.	COTTAGES	: 120 (1971)
MAX DEPTH	: 9.15	m.	RESORTS	: 6 (104)
VOLUME	: 38.61	mill cu. m.	% CROWN LAND	: 0



OTTER LAKE

A good sampling program was carried out with a total of 19 samples collected from two locations on Otter Lake between April 25 and September 28. Chlorophyll concentrations were slightly higher during the summer than during the spring, a pattern that was observed during 1985 as well.

Chlorophyll concentrations were higher and Secchi disc visibility depth lower than was the case during 1985. This pattern of higher chlorophyll concentrations and reduced water clarity was observed in other lakes during 1986 and is believed to be the result of the unusually wet weather experienced during the summer.

Chlorophyll concentrations for both 1985 and 1986 are higher than for previous years in the record owing to a change in the analytical procedure for chlorophyll introduced by the laboratory in 1985. The new procedure increases the recovery and detection of chlorophyll from lake samples.

The mean Secchi disc visibility depth and chlorophyll concentration record indicate Otter Lake has very good water quality.

Dr. A. W. Kahn was presented with an awards plaque for his ten year record of water quality sampling on Otter Lake. The presentation was made at a Self Help Program awards ceremony held in Kingston on September 19, 1986.

LAKE : OTTER LAKE ID NUMBER : 18-0033-024-01
TWP : BASTARD, SOUTH ELMSLEY, SOUTH BURGESS, KITLEY
COUNTY : LEEDS

WATERSHED AREA	: 46.55	sq.km	SHORELINE	: 20.1	km.
SURFACE AREA	: 602.0	ha.	COTTAGES	: 291 + 5 HOUSES	
MAX DEPTH	: 36.60	m.	RESORTS	: 6 (214)	
VOLUME	: 60.46	mill cu. m.	% CROWN LAND	: 1	

STATION 1

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
08/04/86	2.6	4.2
08/10/86	2.4	3.0
08/17/86	2.4	2.2
08/28/86	3.1	4.1
09/01/86	3.4	3.8
09/07/86	3.4	3.4
09/14/86	3.7	4.8
09/21/86	3.7	4.1
09/28/86	4.0	4.1
MEAN	3.1	3.7
MAX	4.0	4.8
MIN	2.4	2.2
N	9	9
SD	0.60	0.77

STATION 2

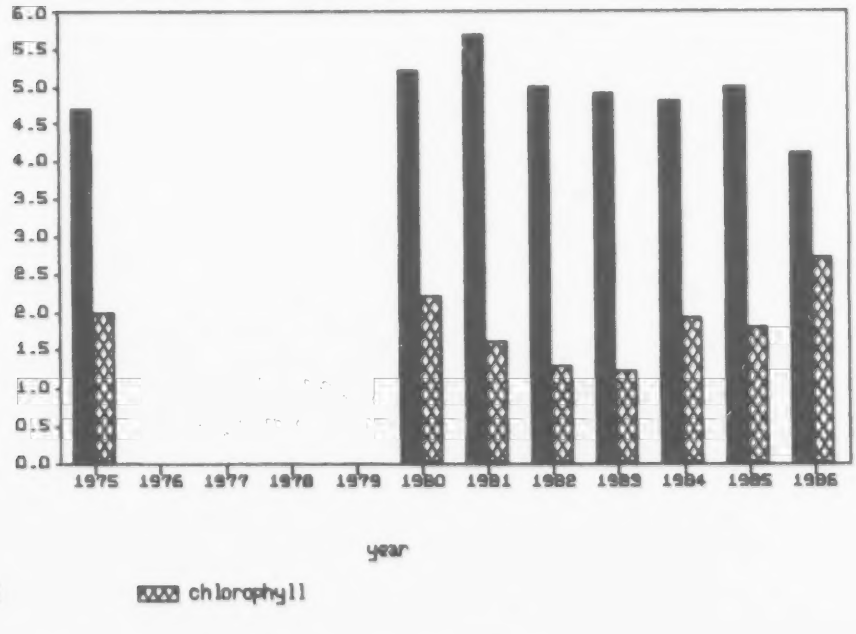
SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/25/86	3.0	1.9
06/07/86	2.6	2.7
06/14/86	2.4	2.2
06/21/86	2.7	2.2
06/29/86	3.3	5.2
07/19/86	2.7	3.0
08/03/86	2.1	3.4
08/10/86	2.3	4.1
08/16/86	2.4	3.2
09/01/86	2.6	4.0
MEAN	2.6	3.1
MAX	3.3	5.2
MIN	2.1	1.9
N	10	10
SD	0.35	1.03

LAKE : OTTER LAKE ID NUMBER : 18-0033-024-01
TWP : BASTARD, SOUTH ELMSLEY, SOUTH BURGESS, KITLEY
COUNTY : LEEDS

WATERSHED AREA	: 46.55	sq.km	SHORELINE	: 20.1	km.
SURFACE AREA	: 602.0	ha.	COTTAGES	: 291 + 5 HOUSES	
MAX DEPTH	: 36.60	m.	RESORTS	: 6 (214)	
VOLUME	: 60.46	mill cu. m.	% CROWN LAND	: 1	

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	3.4	1.6
1976	3.1	2.5
1977	3.0	2.1
1978	3.3	2.0
1979	3.1	2.3
1980	2.7	2.3
1981 ‡‡	3.1	2.1
1982 ‡‡	3.1	1.5
1983	3.2	1.4
1984	3.0	2.1
1985	3.0	2.3
1986	2.9	3.4
MEAN	3.0	2.1
MAX	3.4	3.4
MIN	2.7	1.4
N	12	12
SD	0.18	0.53

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



OTTY LAKE

A good sampling program was carried out with sampling from June 10 to September 2 at two locations on the lake. Generally, chlorophyll concentrations were lower and Secchi disc visibility better during the month of July than other sampling dates but this pattern might as much be a result of normal variability from one sampling date to the next as the result of a seasonal influence. There was essentially no difference in water quality between the two locations on Otty Lake.

Higher chlorophyll concentrations for 1985 and 1986 compared to most previous years of record are the result of a change in the laboratory procedure for the analysis of chlorophyll introduced in 1985. The new procedure increased the recovery and detection of chlorophyll from lake water samples.

A reduction in water clarity and an increase in chlorophyll concentrations from 1985 to 1986 was observed in Otty Lake. This pattern was observed in other lakes and may be the product of the unusually wet weather experienced during the summer.

Both the 1986 sampling results and those from previous years summarized in the historical record table indicate Otty Lake has good water quality with above average Secchi disc visibility and low levels of algae.

LAKE : OTTY LAKE
TWP : NORTH BURGESS, NORTH ELMSLEY
COUNTY : LANARK

ID NUMBER : 18-0033-025-01

WATERSHED AREA	: 47.9	sq.km	SHORELINE	: 35.4	km.
SURFACE AREA	: 625	ha.	COTTAGES	: 336 + 41 HOUSES	
MAX DEPTH	: 27.4	m.	RESORTS	: 3 (27)	
VOLUME	: 56.41	mill cu. m.	% CROWN LAND	: 0	

SITE "A"

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/10/86	3.4	4.8
06/23/86	3.4	2.9
07/02/86	3.9	4.2
07/06/86	4.9	3.1
07/14/86	4.6	2.8
07/21/86	4.8	2.9
08/05/86	4.2	4.5
08/11/86	4.0	3.1
08/18/86		1.8
08/25/86	4.6	3.4
09/02/86	4.0	3.5
MEAN	4.1	3.3
MAX	4.9	4.8
MIN	3.4	1.8
N	10	11
SD	0.54	0.87

SITE "B"

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/10/86	3.4	4.2
06/23/86	3.7	4.2
07/02/86	3.9	4.6
07/06/86	4.3	3.5
07/14/86	4.9	2.6
07/21/86	4.8	2.9
07/28/86	5.5	2.6
08/05/86	4.3	3.8
08/11/86	4.3	3.2
08/18/86		2.7
08/25/86	4.6	3.6
09/02/86	4.0	3.8
MEAN	4.3	3.4
MAX	5.5	4.6
MIN	3.1	2.6
N	11	12
SD	0.65	0.69

LAKE : OTTY LAKE
TWP : NORTH BURGESS, NORTH ELMSLEY
COUNTY : LANARK

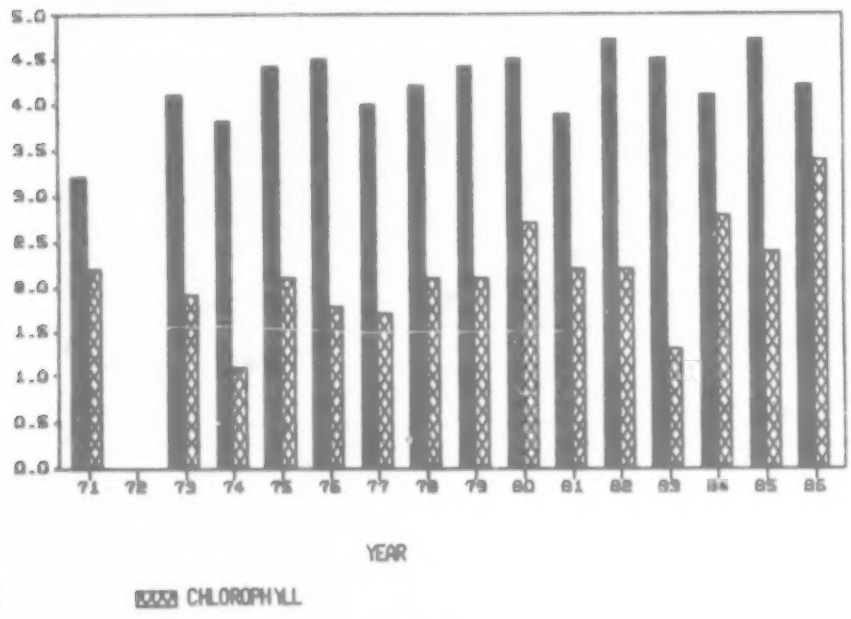
ID NUMBER : 18-0033-025-01

WATERSHED AREA	: 47.9	sq.km	
SURFACE AREA	: 625	ha.	
MAX DEPTH	: 27.4	m.	
VOLUME	: 56.41	mill cu. m.	

SHORELINE	: 35.4	km.
COTTAGES	: 336 + 41 HOUSES	
RESORTS	: 3 (27)	
% CROWN LAND	: 0	

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1971 ‡‡	3.2	2.2
1973 ‡‡	4.1	1.9
1974	3.8	1.1
1975 ‡‡	4.4	2.1
1976	4.5	1.8
1977	4.0	1.7
1978	4.2	2.1
1979	4.4	2.1
1980	4.5	2.7
1981	3.9	2.2
1982	4.7	2.2
1983	4.5	1.3
1984	4.1	2.8
1985	4.7	2.4
1986	4.2	3.4
MEAN	4.2	2.1
MAX	4.7	3.4
MIN	3.2	1.1
N	15	15
SD	0.39	0.57

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



PAUGH LAKE

Insufficient sampling was carried out to obtain any meaningful results. A minimum of six sets of measurements is necessary to adequately characterize water quality of a lake. Ideally 12 or more samples evenly timed throughout the ice free season from May until October should be collected to define any seasonal trends if they are present.

The Secchi disc visibility depth and chlorophyll concentration record from 1977 to present indicate Paugh Lake has exceptionally good water clarity and excellent water quality.

LAKE : PAUGH LAKE
TWP : BURNS, SHERWOOD
COUNTY : RENFREW

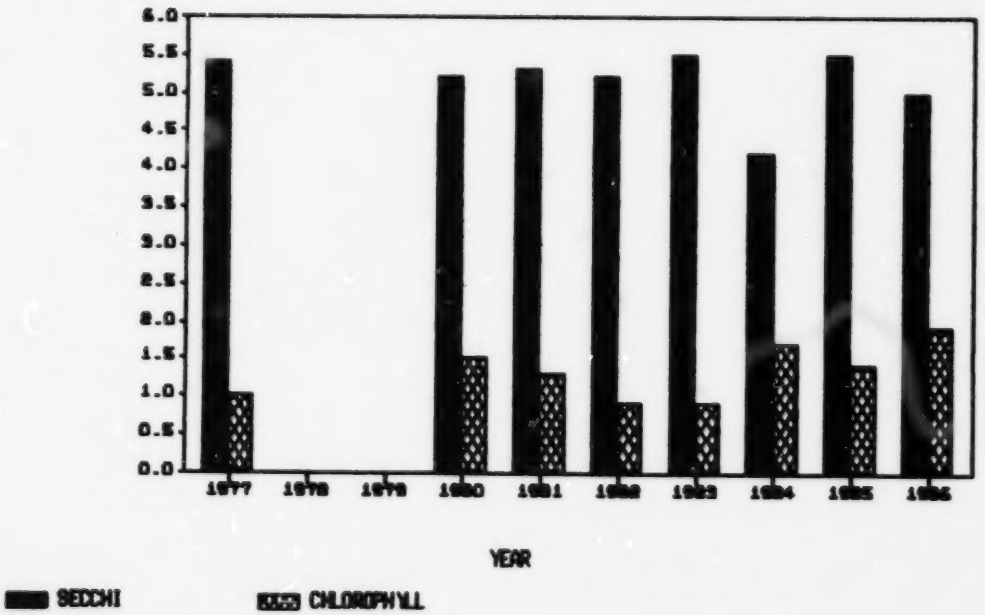
ID NUMBER : 18-3690-009-01

WATERSHED AREA	: 75.00	sq.km	SHORELINE	: 18.00 km.
SURFACE AREA	: 713.0	ha.	COTTAGES	: 77
MAX DEPTH	: 51.80	m.	RESORTS	: 1 (7)
VOLUME	: 100	mill cu. m.	% CROWN LAND	: 80

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/08/86	5.2	
07/06/86	4.8	2.6
07/23/86	5.3	1.5
08/06/86	4.7	2.0
09/01/86	5.0	1.5
MEAN	5.0	1.9
MAX	5.3	2.6
MIN	4.7	1.5
N	5	4
SD	0.25	0.52

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1977 ‡‡	5.4	1.0
1980	5.2	1.5
1981	5.3	1.3
1982	5.2	0.9
1983	5.5	0.9
1984 ‡‡	4.2	1.7
1985	5.5	1.4
1986 ‡	5.0	1.9
MEAN	5.1	1.3
MAX	5.5	1.9
MIN	4.2	0.9
N	8	8
SD	0.42	0.37

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



PIKE LAKE

A good sampling program was conducted on Pike Lake with 13 samples collected from June 8 to September 21. Chlorophyll concentrations increased markedly and water clarity declined as the summer progressed. This pattern was shared by a number of other lakes including Black Lake. Chlorophyll concentrations while quite high during September did not represent bloom conditions as no complaints of nuisance algae were received by the Ministry of the Environment.

Higher chlorophyll concentrations during 1986 as compared to 1985 are believed to be the result of the unusually wet weather experienced during the summer. Higher chlorophyll concentrations are also the result of increased recovery and detection of chlorophyll from lake samples by an improvement to the analytical procedure for chlorophyll introduced by the laboratory in 1985.

The Secchi disc visibility depth and chlorophyll concentration record indicate Pike Lake has good water quality.

Mr. A. Hnatiuk was presented an award plaque by the Ministry of the Environment for his participation and that of other members of the Pike Lake Property Owners Association in the Self Help Program. The presentation was made at an awards ceremony held in Kingston on September 19, 1986.

LAKE : PIKE LAKE
TWP : NORTH BURGESS, NORTH CROSBY
COUNTY : LANARK, LEEDS

ID NUMBER : 18-0033-028-01

WATERSHED AREA	: 60.00	sq.km	SHORELINE	: 22.10 km.
SURFACE AREA	: 316.0	ha.	COTTAGES	: 143 (1974)
MAX DEPTH	: 32.60	m.	RESORTS	: 2 (38)
VOLUME	: 26.58	mill cu. m.	% CROWN LAND	: 0

STATION 1

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/08/86	3.4	4.1
06/14/86	4.1	3.7
06/22/86	3.8	4.3
07/01/86	3.8	4.5
07/06/86	3.5	5.0
07/20/86	4.1	4.2
08/06/86	2.6	5.7
08/12/86	2.6	6.7
08/18/86	2.3	7.6
08/25/86	2.6	7.3
09/07/86	2.3	8.8
09/14/86	2.9	10.4
09/21/86	2.6	9.6
MEAN	3.1	6.3
MAX	4.1	10.4
MIN	2.3	3.7
N	13	13
SD	0.68	2.27

STATION 2

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/15/86	4.6	1.3
07/01/86	4.3	4.8
07/13/86	3.8	4.9
07/27/86	3.8	5.0
08/10/86	3.4	6.0
09/01/86	2.9	8.1
09/14/86	2.9	10.1
09/28/86	2.6	14.7
10/12/86	2.4	13.0
MEAN	3.4	7.5
MAX	4.6	14.7
MIN	2.4	1.3
N	9	9
SD	0.77	4.33

LAKE : PIKE LAKE
TWP : NORTH BURGESS, NORTH CROSBY
COUNTY : LANARK, LEEDS

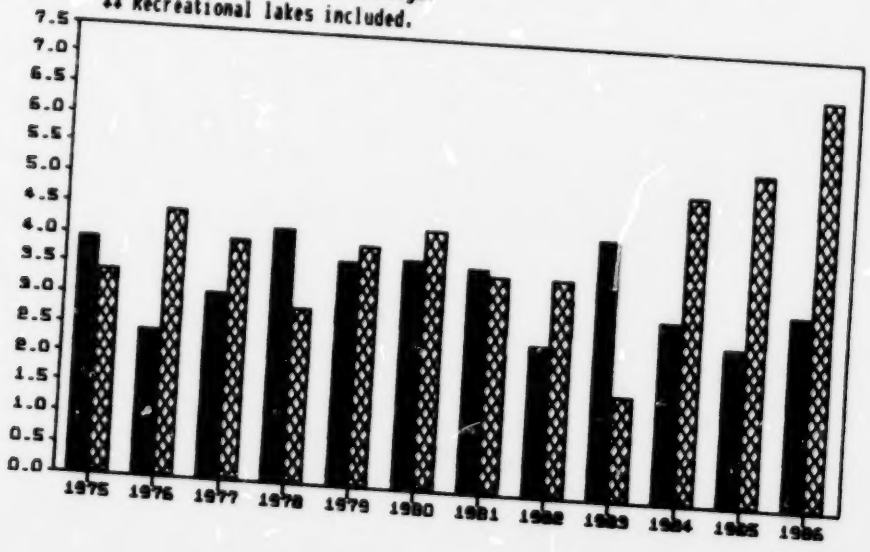
ID NUMBER : 18-0033-028-01

WATERSHED AREA	: 60.00	sq.km	SHORELINE	: 22.10 km.
SURFACE AREA	: 316.0	ha.	COTTAGES	: 143 (1974)
MAX DEPTH	: 32.60	m.	RESORTS	: 2 (38)
VOLUME	: 26.58	mill cu. m.	% CROWN LAND	: 0

STATIONS 1 AND 2 COMBINED

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	3.9	3.4
1976	2.4	4.4
1977	3.1	4.0
1978	4.2	2.9
1979	3.7	4.0
1980	3.8	4.3
1981	3.7	3.6
1982	2.5	3.6
1983 ‡‡	4.3	1.7
1984 ‡	3.0	5.1
1985	2.6	5.5
1986	3.2	6.8
MEAN	3.3	4.1
MAX	4.3	6.8
MIN	2.4	1.7
N	12	12
SD	0.66	1.30

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



REDHORSE LAKE

An extremely comprehensive sampling program was carried out with 16 samples collected on the east basin from April 10 to October 25 and 11 samples on the west basin from June 13 to October 17. Chlorophyll concentrations were generally somewhat higher and water clarity a little less during the summer and fall than during the spring.

Higher chlorophyll concentrations and reduced water clarity compared to 1985 conditions, particularly apparent on the west basin, are likely due to the unusually wet weather experienced during the summer. This decline in water quality was seen in other lakes.

Higher chlorophyll concentrations during 1986 and 1985 compared to 1984 and previous years is due to a change in the analytical procedure for chlorophyll introduced by the laboratory at the beginning of the 1985 season. The change in the procedure has increased the recovery and detection of chlorophyll from lake samples.

The chlorophyll and Secchi disc visibility depth record show that Redhorse Lake is a moderately productive lake with good water clarity.

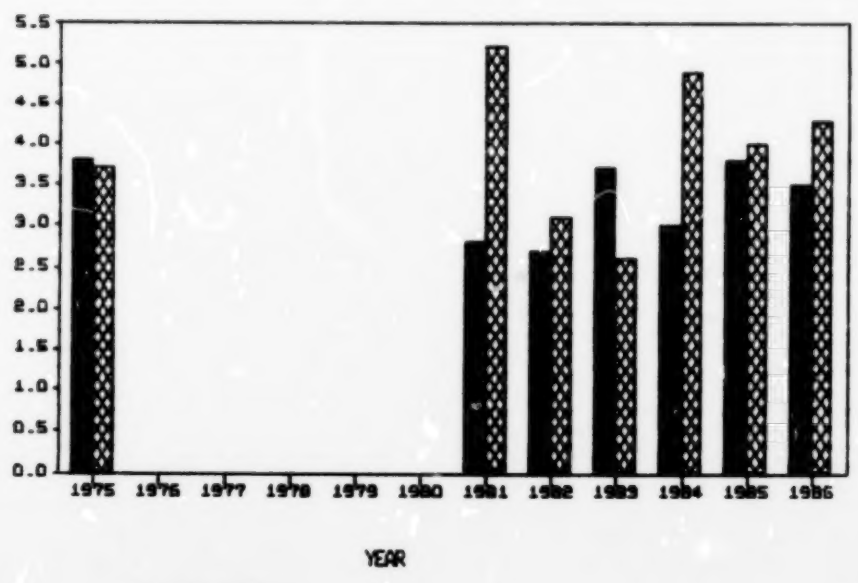
LAKE : RED HORSE LAKE : EAST BASIN ID NUMBER : 12-0017-020-01
TWP : REAR OF LEEDS & LANSDOWNE
COUNTY : LEEDS

WATERSHED AREA	: 335.00	sq.km	SHORELINE	: 12.90	km.
SURFACE AREA	: 135.0	ha.	COTTAGES	: 24	
MAX DEPTH	: 37.00	m.	RESORTS	: 1 (16)	
VOLUME	: 15.55	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/10/86	2.7	3.4
05/24/86	4.3	1.8
06/07/86	4.0	3.7
06/14/86	4.0	3.4
06/21/86	3.4	4.2
07/03/86	3.3	5.7
07/08/86	3.7	6.5
07/16/86	3.0	5.1
08/02/86	3.4	3.3
08/09/86	3.4	3.9
08/23/86	3.2	4.2
08/30/86	3.4	2.0
09/13/86	4.0	5.1
09/27/86	3.4	5.7
10/11/86	3.4	6.3
10/25/86	3.7	5.7
MEAN	3.5	4.3
MAX	4.3	6.5
MIN	2.7	1.8
N	16	16
SD	0.41	1.43

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	3.8	3.7
1981 ‡‡	2.8	5.2
1982 ‡‡	2.7	3.1
1983 ‡‡	3.7	2.6
1984 ‡‡	3.0	4.9
1985	3.8	4.0
1986	3.5	4.3
MEAN	3.3	3.9
MAX	3.8	5.2
MIN	2.7	2.6
N	7	7
SD	0.48	0.93

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



LAKE : RED HORSE LAKE : WEST BASIN ID NUMBER : 12-0017-013-01
TWP : REAR OF LEEDS & LANSDOWNE
COUNTY : LEEDS

WATERSHED AREA	: 330.00	sq.km	SHORELINE	: 13.80	km.
SURFACE AREA	: 167.0	ha.	COTTAGES	: 18	
MAX DEPTH	: 37.00	m.	RESORTS	: 0	
VOLUME	: 15.07	mill cu. m.	% CROWN LAND	: 0	

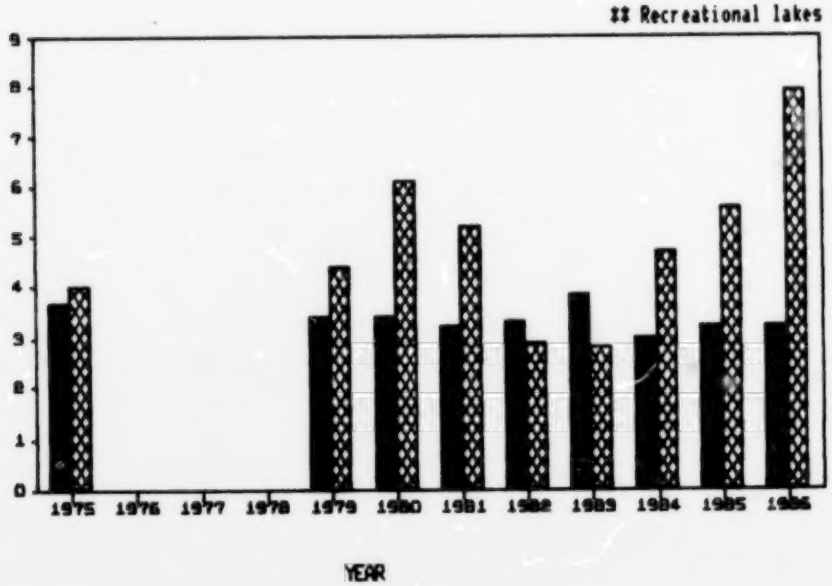
WEST BASIN

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/13/86	3.7	5.7
06/22/86	3.1	5.9
07/07/86	4.3	6.7
07/16/86	3.0	7.2
08/04/86	3.1	7.2
08/10/86	3.4	7.3
08/26/86	2.9	6.9
09/01/86	3.1	7.5
09/24/86	3.2	12.2
10/05/86	3.2	9.3
10/17/86	2.9	11.4
MEAN	3.2	7.9
MAX	4.3	12.2
MIN	2.9	5.7
N	11	11
SD	0.41	2.13

WEST BASIN

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	3.7	4.0
1979	3.4	4.4
1980	3.4	6.1
1981 ‡‡	3.2	5.2
1982 ‡‡	3.3	2.9
1983 ‡‡	3.8	2.8
1984 ‡‡	3.0	4.7
1985	3.2	5.6
1986	3.2	7.9
MEAN	3.3	4.8
MAX	3.8	7.9
MIN	3.0	2.8
N	9	9
SD	0.26	1.60

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



ROBINSON LAKE

Eight samples were collected from July 1 to September 7. Apart from a single water clarity reading of 4 metres on August 4, there was not much variability in the results.

This is the first year for the inclusion of Robinson Lake in the Self Help Program. Previous sampling of the lake including water clarity readings and chlorophyll samples were taken by the Ministry of the Environment.

The results indicate that Robinson Lake has very good water quality. The apparent decline in water quality from 1985 to 1986 may be the result of a subjective difference in interpretation of Secchi disc visibility difference between different observers.

LAKE : ROBINSON LAKE
TWP : LIMERICK
COUNTY : HASTINGS

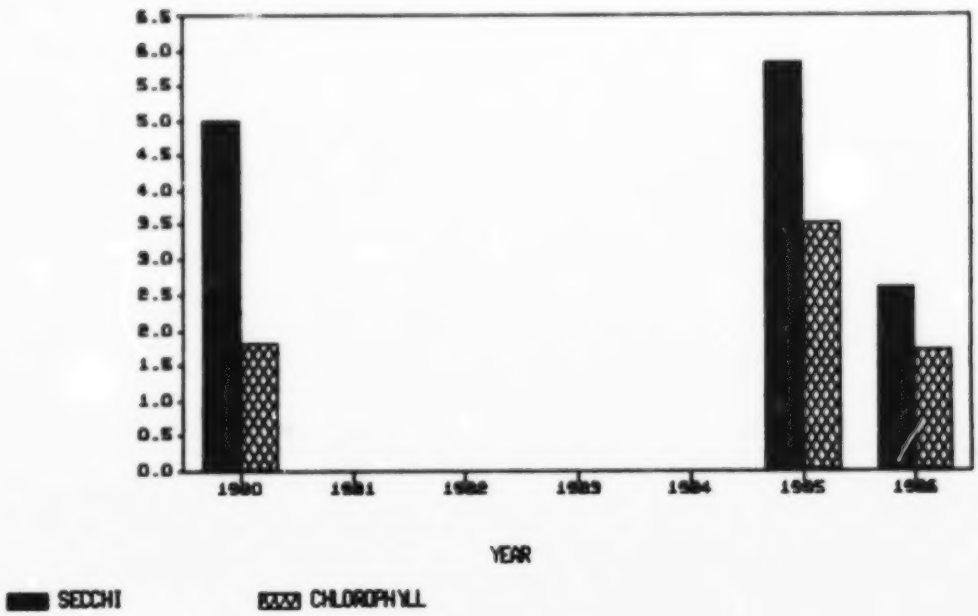
ID NUMBER : 17-0021-016-01

WATERSHED AREA	: 4.9	sq.km	SHORELINE	: 5.96	km.
SURFACE AREA	: 25	ha.	COTTAGES	: 25	
MAX DEPTH	: 34.76	m.	RESORTS	: 0	
VOLUME	: 1.78	mill cu. m.	% CROWN LAND	:	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/01/86	3.7	1.6
07/05/86	2.1	1.3
07/20/86	2.4	2.4
08/04/86	4.0	2.1
08/24/86	2.1	2.2
08/24/86	2.4	
09/03/86	2.4	1.4
09/07/86	2.4	1.5
MEAN	2.6	1.7
MAX	4.0	2.4
MIN	2.1	1.3
N	8	7
SD	0.73	0.44

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1980 ‡‡	5.0	1.8
1985 ‡‡	5.8	3.5
1986	2.6	1.7
MEAN	4.4	2.3
MAX	5.8	3.5
MIN	2.6	1.7
N	3	3
SD	1.67	1.01

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



SAINT ANDREW LAKES

Eleven samples collected from June 30 to September 13. Although there was not much evidence of seasonal variability in chlorophyll concentrations, water clarity was not as good during August and September than was the case during July. The presence or absence of a spring peak in chlorophyll cannot be confirmed.

Chlorophyll concentrations were considerably higher in Saint Andrew Lakes during 1986 than for most previous years that the lake has been sampled. The laboratory introduced a change in the analytical procedure for chlorophyll at the beginning of the 1985 sampling season. The new procedure has increased the recovery and detection of chlorophyll from lake samples. Results for 1985 and 1986 are not comparable to results for 1984 and previous years without the application of a correction factor. Additionally, the unusually wet weather experienced last summer likely contributed to an increase in chlorophyll production. Most lakes seemed to have experienced an increase in productivity as a result of increased amounts of rainfall and runoff.

Although conditions were not as good in Saint Andrew Lakes as in previous years, the Secchi disc visibility depth and chlorophyll concentration record indicate Saint Andrew Lakes have good water quality.

LAKE : SAINT ANDREW LAKES
TWP : HINCHINBROOKE
COUNTY : FRONTENAC

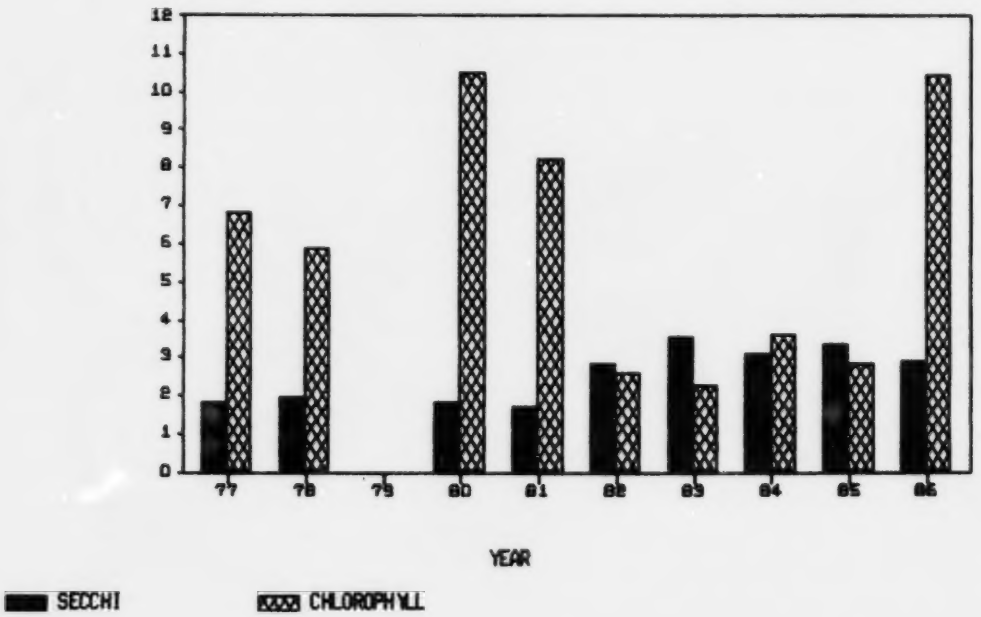
ID NUMBER : 17-0035-006-01

WATERSHED AREA	: 2.80	sq.km	SHORELINE	: 7.60	km.
SURFACE AREA	: 79.0	ha.	COTTAGES	: 20 (1983)	
MAX DEPTH	: 15.80	m.	RESORTS	: 0	
VOLUME	: 5.05	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/30/86	3.2	7.7
07/06/86	3.2	8.1
07/13/86	3.2	11.9
07/14/86	3.2	12.0
07/20/86	3.2	13.8
07/27/86	3.2	12.5
08/03/86	2.9	10.9
08/10/86	2.9	8.9
08/14/86	3.2	7.0
09/06/86	2.3	10.7
09/13/86	2.0	11.7
MEAN	2.9	10.4
MAX	3.2	13.8
MIN	2.0	7.0
N	11	11
SD	0.42	2.22

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1977	1.8	6.8
1978 ‡	1.9	5.9
1980	1.8	10.5
1981	1.7	8.2
1982	2.8	2.6
1983 ‡‡	3.5	2.3
1984	3.1	3.6
1985	3.3	2.8
1986	2.9	10.4
MEAN	2.5	5.9
MAX	3.5	10.5
MIN	1.7	2.3
N	9	9
SD	0.73	3.28

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



LAKE SAINT PETER

Only one of the chlorophyll samples submitted during the summer was able to be accepted for analysis. It is believed this problem was related to the change in the laboratory procedure for chlorophyll analysis. The laboratory introduced a new analytical procedure which increases the recovery and detection of chlorophyll from lake samples. The new procedure requires the use of a nylon filter in place of a cellulose filter used by the old procedure. It is possible that the new style nylon type filters were not provided with the supplies to carry out a sampling program on Lake St. Peter during 1986. Chlorophyll samples for Lake St. Peter have been filtered by the participant carrying out the sampling before forwarding to the Ministry of the Environment for analysis.

The Secchi disc visibility depth record for 1986 was preserved. The readings indicate Lake St. Peter has very good water clarity. A mean chlorophyll concentration of 6.8 ug/L based on the one sample that was accepted for analysis can not be considered representative of the lake's condition during 1986.

The long term record of Secchi disc visibility and chlorophyll concentration indicate Lake St. Peter has very good water quality. There are no apparent trends through time in the historical record.

LAKE : SAINT PETER, LAKE
TWP : MCLURE
COUNTY : HASTINGS

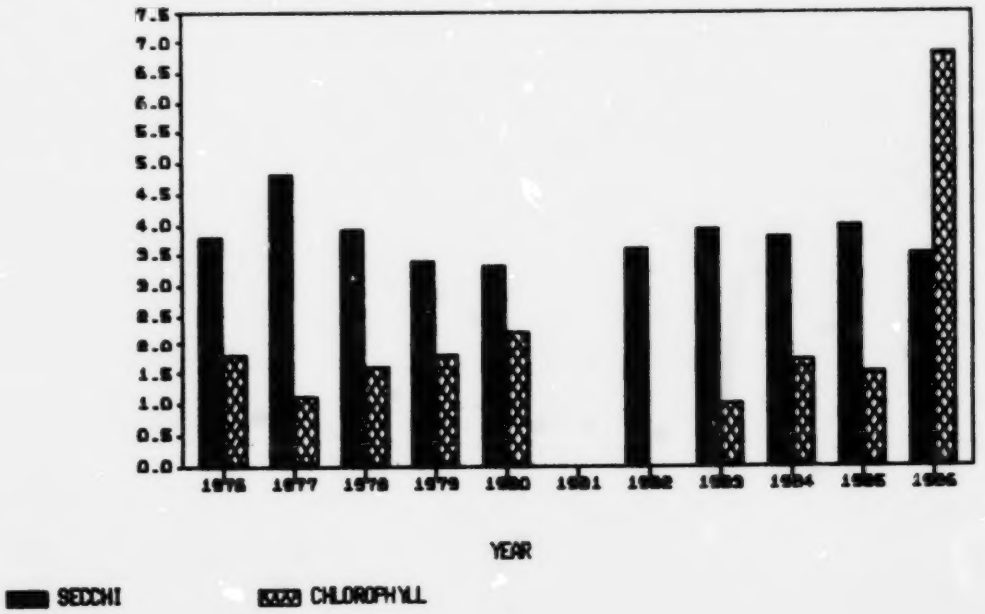
ID NUMBER : 18-3490-031-01

WATERSHED AREA	: 67.00	sq.km	SHORELINE	:	13.20 km.
SURFACE AREA	: 234.0	ha.	COTTAGES	:	182
MAX DEPTH	: 28.70	m.	RESORTS	:	10 (301)
VOLUME	: 17.78	mill cu. m.	% CROWN LAND	:	10

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/22/86	3.7	
07/01/86	2.1	6.8
07/03/86	3.3	
07/08/86	3.6	
07/22/86	4.3	
08/02/86	3.8	
08/12/86	3.7	
09/03/86	4.0	
MEAN	3.5	6.8
MAX	4.3	6.8
MIN	2.1	6.8
N	8	1
SD	0.66	

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1976 ‡‡	3.8	1.8
1977 ‡‡	4.8	1.1
1978 ‡‡	3.9	1.6
1979 ‡‡	3.4	1.8
1980	3.3	2.2
1983 ‡	3.9	1.0
1984 ‡‡	3.8	1.7
1985 ‡	4.0	1.5
1986 ‡	3.5	6.8
MEAN	3.8	2.1
MAX	4.8	6.8
MIN	3.3	1.0
N	10	9
SD	0.42	1.78

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



SALMON TROUT LAKE

Seven samples were collected between mid June and mid October. Variability of chlorophyll concentrations was too great too discern any evidence of seasonality in the results, although Secchi disc visibility was obviously lower from August to October than during June and July.

Higher chlorophyll concentrations during 1985 and 1986 compared to most previous years can be attributed to a change in the analytical procedure for chlorophyll. The new procedure improves the recovery and detection of chlorophyll from lake water samples.

The Secchi disc visibility depth record indicates water clarity is good in Salmon Trout Lake and while chlorophyll concentrations are variable, there is no evidence of nuisance algal conditions in the lake.

LAKE : SALMON TROUT LAKE
TWP : MONTEAGLE
COUNTY : HASTINGS

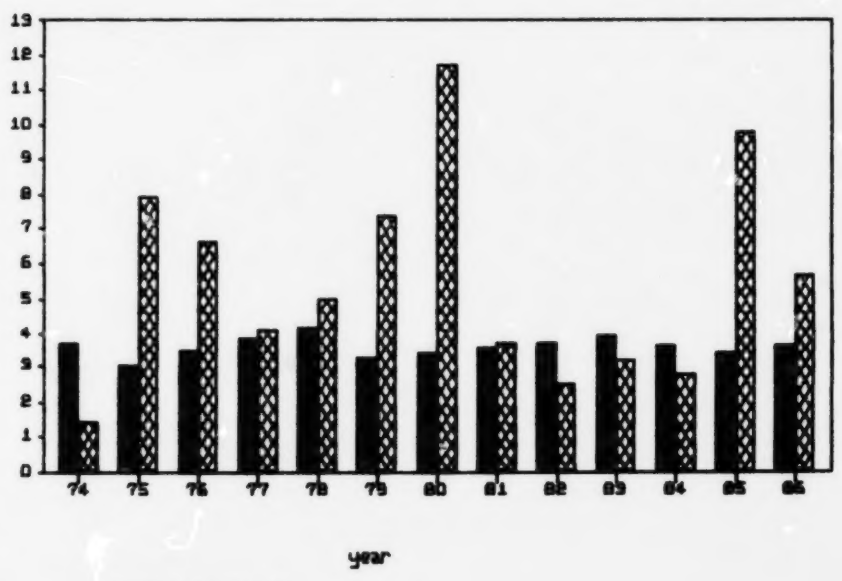
ID NUMBER : 18-3490-032-01

WATERSHED AREA	: 9.25	sq.km	SHORELINE	: 7.90	km.
SURFACE AREA	: 100.0	ha.	COTTAGES	: 70	
MAX DEPTH	: 14.00	m.	RESORTS	: 0	
VOLUME	: 3.8	mill cu. m.	% CROWN LAND	: 21	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/15/86	4.0	6.9
07/07/86	4.3	8.6
07/22/86	4.6	3.6
08/04/86	3.6	5.2
08/17/86	3.7	3.6
09/14/86	3.1	4.8
10/12/86	2.4	7.5
MEAN	3.6	5.7
MAX	4.6	8.6
MIN	2.4	3.6
N	7	7
SD	0.74	1.96

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1974	3.7	1.4
1975 ‡	3.0	7.9
1976 ‡‡	3.4	6.6
1977 ‡‡	3.8	4.1
1978	4.2	5.0
1979	3.2	7.4
1980	3.3	11.7
1981	3.5	3.7
1982	3.7	2.4
1983	3.9	3.1
1984	3.6	2.7
1985	3.3	9.8
1986	3.6	5.7
MEAN	3.5	5.5
MAX	4.2	11.7
MIN	3.0	1.4
N	13	13
SD	0.32	3.07

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



SAND LAKE

An excellent sampling program was carried out with 23 samples collected between mid April and the end of October. Chlorophyll concentrations and Secchi disc visibility depths were variable but no clear cut seasonal pattern was evident.

Higher chlorophyll concentrations during 1985 and 1986 compared to most previous years in the historical record can be attributed to a change in the analytical procedure for chlorophyll introduced by the laboratory in 1985. The new procedure increases the recovery and detection of chlorophyll from lake water samples.

The Secchi disc visibility depth and chlorophyll concentration record indicate Sand Lake has good water clarity and water quality suitable for a wide range of recreational uses including water oriented activities such as swimming.

LAKE : SAND LAKE
TWP : SOUTH CROSBY
COUNTY : LEEDS

ID NUMBER : 12-0004-017-01

WATERSHED AREA	: 7.32	sq.km	SHORELINE	: 51.50	km.
SURFACE AREA	: 732.0	ha.	COTTAGES	: 110	
MAX DEPTH	: 14.30	m.	RESORTS	: 3 (36)	
VOLUME	: 37.81	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/27/86	3.1	2.4
06/05/86	2.4	4.0
06/10/86	3.1	4.6
06/17/86	3.1	6.8
06/24/86	3.4	3.3
07/01/86	3.0	4.4
07/09/86	3.6	3.5
07/15/86	3.7	4.6
07/22/86	3.4	4.4
07/29/86	2.9	4.4
08/06/86	3.1	4.0
08/13/86	2.7	4.1
08/19/86	2.9	4.3
08/29/86	2.3	3.9
09/02/86	2.4	4.6
09/09/86	2.1	5.4
09/16/86	2.4	6.0
09/24/86	3.0	3.3
10/01/86	2.7	5.1
10/07/86	2.7	4.9
10/14/86	3.1	6.1
10/20/86	3.4	6.3
10/29/86	3.4	4.8
MEAN	2.9	4.5
MAX	3.7	6.8
MIN	2.1	2.4
N	23	23
SD	0.43	1.05

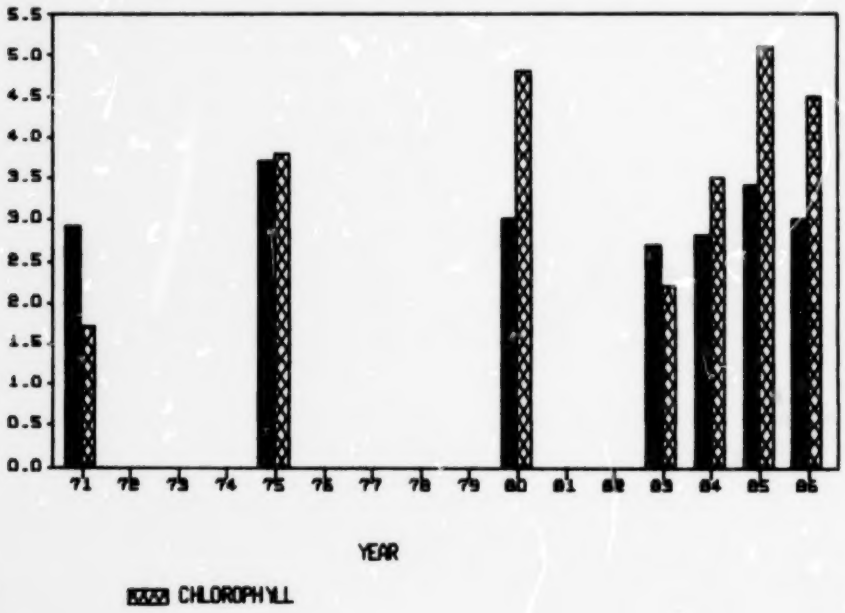
SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1971 ‡‡	2.9	1.7
1975 ‡‡	3.7	3.8
1980	3.0	4.8
1983	2.7	2.2
1984	2.8	3.5
1985	3.4	5.1
1986	3.0	4.5
MEAN	3.0	3.6
MAX	3.7	5.1
MIN	2.7	1.7
N	7	7
SD	0.35	1.30

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.

LAKE : SAND LAKE
TWP : SOUTH CROSBY
COUNTY : LEEDS

ID NUMBER : 12-0004-017-01

WATERSHED AREA	: 7.32	sq.km	SHORELINE	: 51.50 km.
SURFACE AREA	: 732.0	ha.	COTTAGES	: 110
MAX DEPTH	: 14.30	m.	RESORTS	: 3 (36)
VOLUME	: 37.81	mill cu. m.	% CROWN LAND	: 0



SHABOMEKA LAKE

An excellent sampling program was carried out on Shabomeka Lake with 24 samples collected from early April to mid November. Unfortunately samples collected after the first week of November could not be accepted as the laboratory was no longer set up to carry out chlorophyll determinations.

There was no evidence of any pronounced seasonality in the results, although chlorophyll concentrations tended to be slightly higher mid summer than during the rest of the sampling period.

Higher chlorophyll concentrations for 1985 and 1986 compared to most previous years of record are the result of a change in the laboratory procedure for the analysis of chlorophyll introduced in 1985. The new procedure increased the recovery and detection of chlorophyll from lake water samples.

The 1986 sampling results and those from previous years summarized in the historical record table indicate that Shabomeka Lake has excellent water quality with Secchi disc visibility well above average for lakes in the region and with very low levels of algae in the water.

LAKE : SHABOMEKA LAKE
TWP : BARRIE
COUNTY : FRONTENAC

ID NUMBER : 18-3430-034-01

WATERSHED AREA	: 40.90	sq.km	SHORELINE	: 13.70	km.
SURFACE AREA	: 268.0	ha.	COTTAGES	: 104	
MAX DEPTH	: 32.00	m.	RESORTS	: 0	
VOLUME	: 33.19	mill cu. m.	% CROWN LAND	: 50	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/04/86	3.5	2.9
05/11/86	4.0	2.9
05/21/86	4.8	1.3
05/25/86	4.0	1.5
06/05/86	3.7	1.9
06/10/86	4.9	2.0
06/19/86	5.0	1.7
07/01/86	4.5	2.3
07/06/86	4.5	2.4
07/15/86	5.0	4.2
07/21/86	5.0	1.8
07/28/86	5.8	3.1
08/05/86	4.5	3.0
08/11/86	3.0	2.0
08/18/86	4.3	3.0
08/26/86	4.5	2.5
09/02/86	5.0	2.5
09/09/86	4.8	2.4
09/22/86	5.0	2.4
10/01/86	5.1	2.1
10/07/86	4.0	2.6
10/20/86	4.4	
11/03/86	4.9	
11/16/86	4.9	
MEAN	4.5	2.4
MAX	5.8	4.2
MIN	3.0	1.3
N	24	21
SD	0.61	0.65

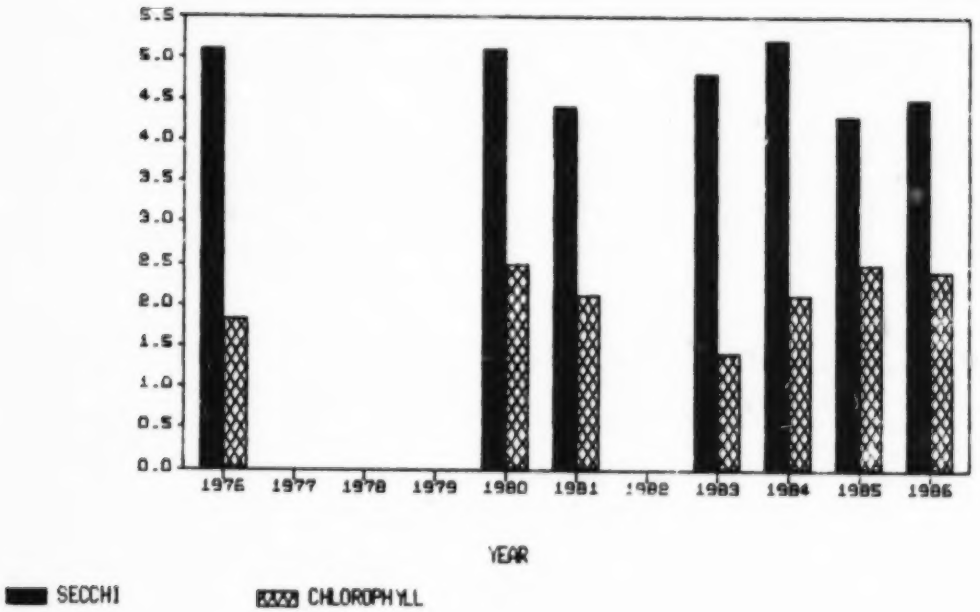
SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1976 ‡‡	5.1	1.8
1980 ‡‡	5.1	2.5
1981	4.4	2.1
1983 ‡	4.8	1.4
1984	5.2	2.1
1985	4.3	2.5
1986	4.5	2.4
MEAN	4.7	2.1
MAX	5.2	2.5
MIN	4.3	1.4
N	7	7
SD	0.37	0.41

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.

LAKE : SHABOMEKA LAKE
TWP : BARRIE
COUNTY : FRONTENAC

ID NUMBER : 18-3430-034-01

WATERSHED AREA	: 40.90	sq.km	SHORELINE	: 13.70	km.
SURFACE AREA	: 268.0	ha.	COTTAGES	: 104	
MAX DEPTH	: 32.00	m.	RESORTS	: 0	
VOLUME	: 33.19	mill cu. m.	% CROWN LAND	: 50	



SILVER LAKE

Fourteen samples were collected from June 22 to October 5. With the exception of a singularly high concentration of 12.4 ug/L on September 8, chlorophyll concentrations showed little variability. Secchi disc visibility was much reduced during the mid part of the sampling period. This variation in water clarity has been detected by sampling on Silver Lake in previous years, but has not been as pronounced as was the case during 1986.

Higher chlorophyll concentrations during 1985 and 1986 compared to 1984 and previous years are a result of a change in the analytical procedure for chlorophyll introduced by the laboratory in 1985. The change in the procedure has increased the recovery and detection of chlorophyll from lake water samples.

Chlorophyll concentrations were higher during 1986 than 1985. This may have been due to the unusually wet weather experienced during the summer. More phosphorus in rainfall and runoff may have produced more algae in lakes.

The Secchi disc visibility depth and chlorophyll record indicate the lake has very good water quality.

An introduction of eurasian milfoil into Silver Lake was discovered and reported to the Ministry of the Environment. It presently occupies an area of 9.4 hectares along the south shore of the lake at its eastern end. Eurasian milfoil is an agressive weed species that can displace native species of aquatic plants and interfere with swimming and boating. While it is difficult to predict what the ultimate distribution of eurasian milfoil in Silver Lake will be, since the established beds are at the downwind end of the lake, further spread may be unlikely.

Miss June Archibald was presented an award by the Ministry of the Environment for her particpation on behalf of the Silver Lake and Area Environmental Protection Association in the Self Help program. The awards presentation was made at ceremony held in Kingston on September 19, 1986.

LAKE : SILVER LAKE
TWP : OSO, SOUTH SHERBROOKE
COUNTY : FRONTENAC, LANARK

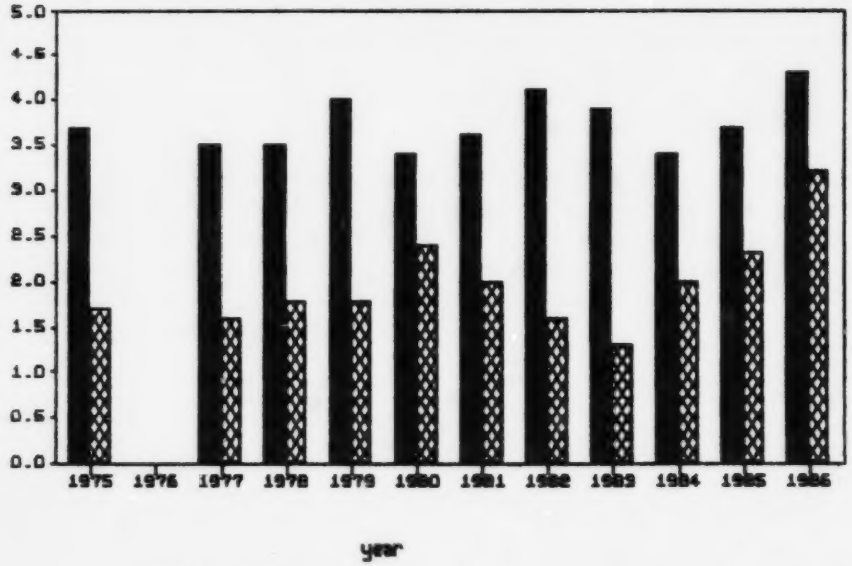
ID NUMBER : 18-3430-027-01

WATERSHED AREA	: 29.70	sq.km	SHORELINE	: 9.20	km.
SURFACE AREA	: 246.0	ha.	COTTAGES	: 87 + 1 HOUSE	
MAX DEPTH	: 24.40	m.	RESORTS	: 3 (185)	
VOLUME	: 24.91	mill cu. m.	% CROWN LAND	: 10	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/22/86	4.9	1.0
06/30/86	5.2	3.7
07/07/86	5.5	3.3
07/13/86	4.5	2.1
07/18/86	4.1	1.6
07/28/86	2.3	3.4
08/04/86	2.8	
08/19/86	3.6	2.1
08/25/86	3.7	2.5
08/31/86	4.1	2.5
09/08/86	4.8	12.4
09/14/86	4.8	2.9
09/28/86	5.7	2.6
10/05/86	5.0	2.4
MEAN	4.3	3.2
MAX	5.7	12.4
MIN	2.3	1.0
N	14	13
SD	0.99	2.84

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	3.7	1.7
1977	3.5	1.6
1978	3.5	1.8
1979 ‡‡	4.0	1.8
1980	3.4	2.4
1981	3.6	2.0
1982	4.1	1.6
1983	3.9	1.3
1984	3.4	2.0
1985	3.7	2.3
1986	4.3	3.2
MEAN	3.7	1.9
MAX	4.3	3.2
MIN	3.4	1.3
N	11	11
SD	0.30	0.52

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



SKOOTAMATTA LAKE

Six samples were collected from July 4 to September 7. There was no evidence of seasonal variability in the results but the presence or absence a spring or fall peak in chlorophyll concentrations cannot be confirmed.

Higher chlorophyll concentrations during 1985 and 1986 compared to 1984 and previous years are a result of a change in the analytical procedure for chlorophyll introduced by the laboratory in 1985. The change in the procedure has increased the recovery and detection of chlorophyll from lake water samples.

Chlorophyll concentrations were higher during 1986 than 1985. This may have been due to the unusually wet weather experienced during the summer. More phosphorus in rainfall and runoff may have produced more algae in lakes.

The Secchi disc visibility depth and chlorophyll record indicate the lake has very good water quality.

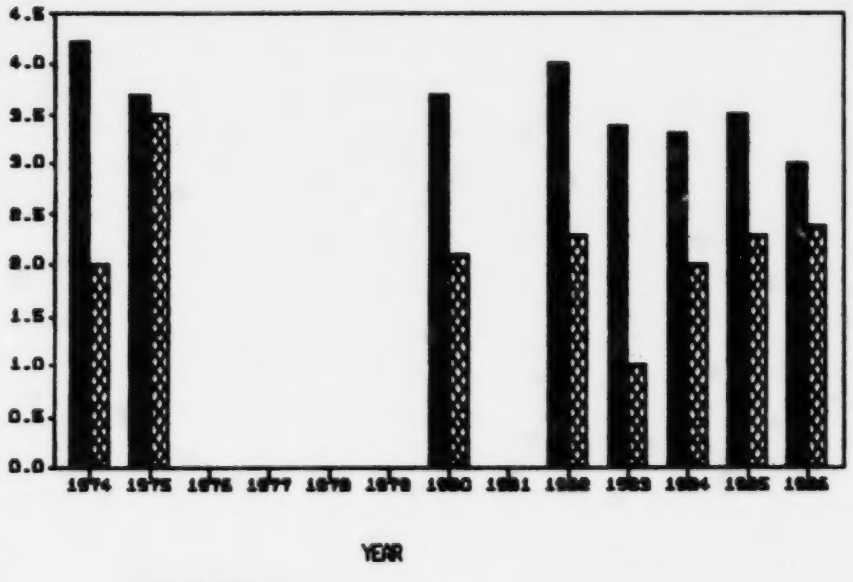
LAKE : SKOOTAMATTA LAKE : UPPER LAKE (W.B) ID NUMBER : 17-0026-005-01
TWP : ANGLESEA
COUNTY : LENNOX & ADDINGTON

WATERSHED AREA	: 49.34	sq.km	SHORELINE	: 9.60	km.
SURFACE AREA	: 456.0	ha.	COTTAGES	: 36 (1974)	
MAX DEPTH	: 29.30	m.	RESORTS	: 0	
VOLUME	: 4.33	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/04/86	2.9	2.4
07/11/86	2.9	3.7
07/25/86	3.2	2.2
08/04/86	3.2	1.4
08/04/86	3.2	1.9
09/07/86	2.9	3.0
MEAN	3.0	2.4
MAX	3.2	3.7
MIN	2.9	1.4
N	6	6
SD	0.16	0.82

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1974 ‡‡	4.2	2.0
1975 ‡‡	3.7	3.5
1980 ‡	3.7	2.1
1982 ‡	4.0	2.3
1983	3.4	1.0
1984	3.3	2.0
1985	3.5	2.3
1986	3.0	2.4
MEAN	3.6	2.2
MAX	4.2	3.5
MIN	3.0	1.0
N	8	8
SD	0.39	0.68

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



SOUTH LAKE

Fifteen samples were collected from July 22 to October 30. Chlorophyll concentrations were variable and generally high, while Secchi disc visibility depths were low. Chlorophyll concentrations of the magnitude experienced during 1986 have not been previously encountered in South Lake. Increased recovery and detection of chlorophyll from lake water samples by a change in the methodology for chlorophyll analysis introduced by the laboratory in 1985 and the unusually wet weather during the summer may be responsible. Increased amounts of phosphorus entering lakes in rainfall and runoff may have resulted in the production of more algae than normal.

The Secchi disc visibility depth and chlorophyll concentration record for 1986 indicate that water quality conditions in South Lake were not as favorable for water oriented recreational activities as in previous years of record. A similar situation was noted in Troy Lake.

LAKE : SOUTH LAKE
TWP : FRONT & REAR OF LEEDS & LANSDOWNE
COUNTY : LEEDS

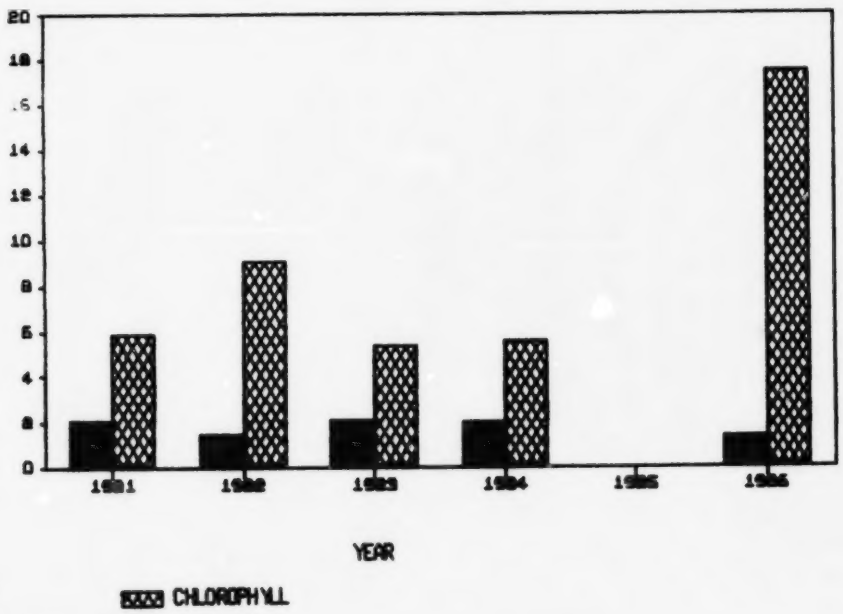
ID NUMBER : 12-0017-019-01

WATERSHED AREA	: 38.91	sq.km	SHORELINE	: 10.94 km.
SURFACE AREA	: 220.0	ha.	COTTAGES	: 17 + 1 HOUSE
MAX DEPTH	: 14.63	m.	RESORTS	: 0
VOLUME	: 11.73	mill cu. m.	% CROWN LAND	: 1

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
07/22/86	1.2	7.5
07/30/86	1.5	7.9
08/07/86	1.8	8.4
08/13/86	1.5	12.1
08/21/86	1.2	14.1
08/28/86	1.5	16.6
09/04/86	1.4	19.9
09/11/86	1.2	22.2
09/18/86	1.2	28.8
09/24/86	1.5	35.5
10/02/86	1.2	31.0
10/10/86	1.2	9.7
10/17/86	1.2	42.1
10/24/86	1.2	4.3
10/30/86	1.8	3.0
MEAN	1.3	17.5
MAX	1.8	42.1
MIN	1.2	3.0
N	15	15
SD	0.22	12.04

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1981 ‡‡	2.1	5.9
1982 ‡‡	1.5	9.0
1983 ‡‡	2.1	5.3
1984 ‡‡	2.0	5.5
1986	1.3	17.5
MEAN	1.8	8.6
MAX	2.1	17.5
MIN	1.3	5.3
N	5	5
SD	0.37	5.18

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



STEENBURG LAKE

Sampling from three locations on Steenburg Lake did not reveal the presence of any marked regional differences or pronounced seasonal variability in water quality. Results for the three locations were combined for the purpose of the historical annual mean summary table.

Higher chlorophyll concentrations during 1985 and 1986 compared to 1984 and previous years are a result of a change in the analytical procedure for chlorophyll introduced by the laboratory in 1985. The change in the procedure has increased the recovery and detection of chlorophyll from lake water samples.

Chlorophyll concentrations were higher during 1986 than 1985. This may have been due to the unusually wet weather experienced during the summer. More phosphorus in rainfall and runoff may have produced more algae in lakes.

The Secchi disc visibility depth and chlorophyll record indicate the lake has very good water quality.

LAKE : STEENBURG LAKE
TWP : TUDOR, LIMERICK
COUNTY : HASTINGS

ID NUMBER : 17-0021-011-01

WATERSHED AREA	: 21.50	sq.km	SHORELINE	: 13.70	km.
SURFACE AREA	: 277.0	ha.	COTTAGES	: 203	
MAX DEPTH	: 20.10	m.	RESORTS	: 0	
VOLUME	: 15.62	mill cu. m.	% CROWN LAND	: 0	

BEACH BAY

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/24/86	3.7	1.7
07/27/86	4.2	2.8
08/03/86	3.7	4.3
08/31/86	4.0	2.8
MEAN	3.9	2.9
MAX	4.2	4.3
MIN	3.7	1.7
N	4	4
SD	0.24	1.07

PHILLIPS BAY

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/24/86	4.9	2.1
07/27/86	3.9	2.9
08/03/86	4.6	5.4
08/24/86	3.7	3.3
08/31/86	3.3	3.1
MEAN	4.0	3.3
MAX	4.9	5.4
MIN	3.3	2.1
N	5	5
SD	0.66	1.23

WEST BASIN

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/24/86	4.3	1.9
07/27/86	4.3	3.3
08/03/86	3.4	4.6
08/12/86	3.1	2.1
08/15/86	4.0	
08/16/86	4.0	3.3
08/24/86	3.4	4.6
08/31/86	3.4	2.5
MEAN	3.7	3.1
MAX	4.3	4.6
MIN	3.1	1.9
N	8	7
SD	0.47	1.11

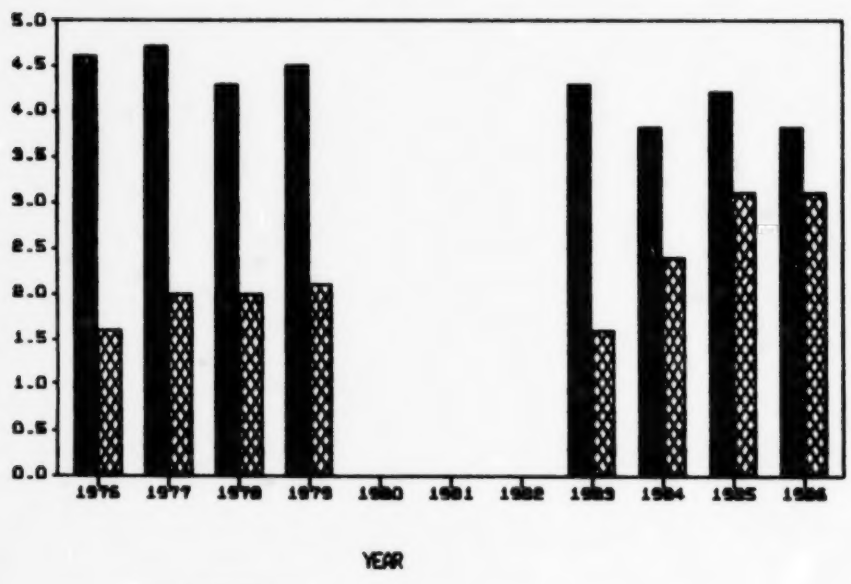
LAKE : STEENBURG LAKE
TWP : TUDOR, LIMERICK
COUNTY : HASTINGS

ID NUMBER : 17-0021-011-01

WATERSHED AREA	: 21.50	sq.km	SHORELINE	: 13.70	km.
SURFACE AREA	: 277.0	ha.	COTTAGES	: 203	
MAX DEPTH	: 20.10	m.	RESORTS	: 0	
VOLUME	: 15.62	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1976 ‡‡	4.6	1.6
1977	4.7	2.0
1978	4.3	2.0
1979	4.5	2.1
1983	4.3	1.6
1984	3.8	2.4
1985 ‡	4.2	3.1
1986	3.8	3.1
MEAN	4.2	2.2
MAX	4.7	3.1
MIN	3.8	1.6
N	8	8
SD	0.34	0.59

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



STOCO LAKE

Insufficient sampling was carried out during 1986 to obtain and meaningful results. A minimum of six sets of measurements each year is necessary to adequately characterize the water quality of a lake and preferably 12 or more sets of measurements evenly timed throughout the ice free season from May to October to define any seasonal trends if they are present.

Although insufficient sampling was carried out to draw any definitive conclusions with regard to water quality conditions in Stoco Lake during 1986, it would appear that water quality was better than that observed during 1984 and 1985.

LAKE : STOCO LAKE
TWP : HUNGERFORD
COUNTY : HASTINGS

ID NUMBER : 17-0026-008-01

WATERSHED AREA	: 2230.00	sq.km	SHORELINE	: 16.00	km.
SURFACE AREA	: 500.0	ha.	COTTAGES	: 90	
MAX DEPTH	: 9.76	m.	RESORTS	: 4 (26)	
VOLUME	: 19.93	mill cu. m.	% CROWN LAND	: 0	

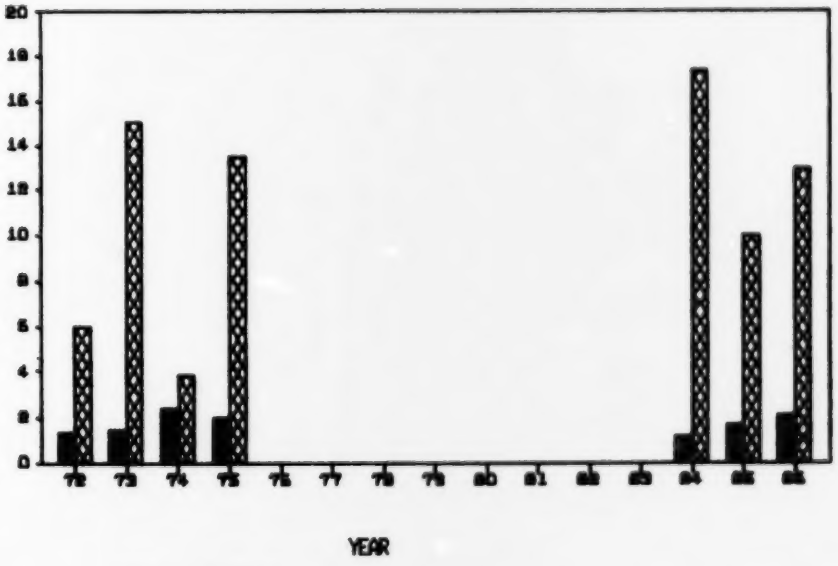
NORTH BASIN

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
08/27/86	2.1	12.9

NORTH BASIN

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1972 ‡‡	1.3	6.0
1973 ‡‡	1.5	15.0
1974 ‡‡	2.4	3.9
1975 ‡‡	2.0	13.4
1984 ‡‡	1.2	17.4
1985	1.6	10.0
1986 ‡	2.1	12.9
MEAN	1.7	11.2
MAX	2.4	17.4
MIN	1.2	3.9
N	7	7
SD	0.45	4.87

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



LAKE : STOCD LAKE
TWP : HUNGERFORD
COUNTY : HASTINGS

ID NUMBER : 17-0026-008-01

WATERSHED AREA	: 2230.00	sq.km	SHORELINE	: 16.00 km.
SURFACE AREA	: 500.0	ha.	COTTAGES	: 90
MAX DEPTH	: 9.76	m.	RESORTS	: 4 (26)
VOLUME	: 19.93	mill cu. m.	% CROWN LAND	: 0

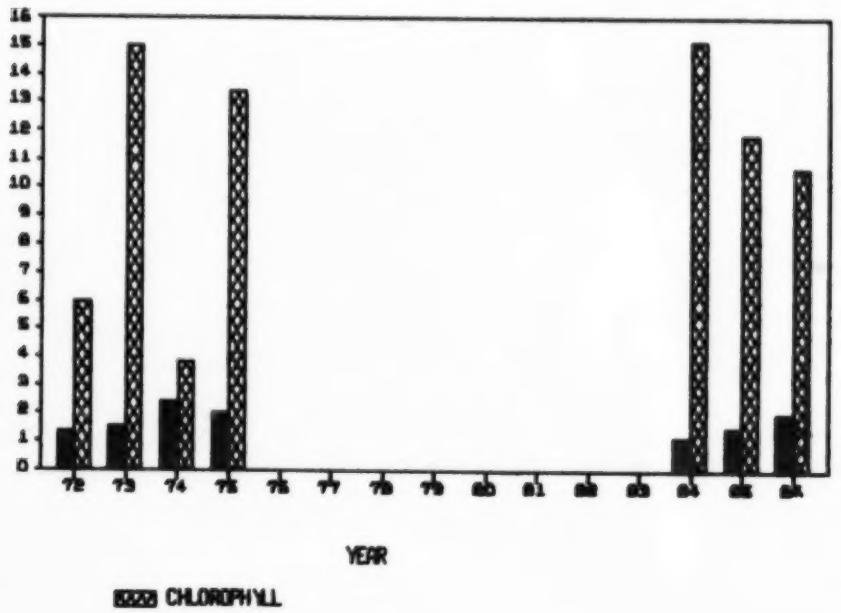
SOUTH BASIN

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
08/05/86	2.0	8.6
08/13/86	1.8	8.8
08/20/86	2.1	15.2
09/02/86	2.1	10.4
MEAN	2.0	10.7
MAX	2.1	15.2
MIN	1.8	8.6
N	4	4
SD	0.14	3.07

SOUTH BASIN

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1972 ‡‡	1.3	6.0
1973 ‡‡	1.5	15.0
1974 ‡‡	2.4	3.9
1975 ‡‡	2.0	13.4
1984 ‡‡	1.2	15.1
1985	1.5	11.9
1986 ‡	2.0	10.7
MEAN	1.7	10.8
MAX	2.4	15.1
MIN	1.2	3.9
N	7	7
SD	0.44	4.37

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



THIRTEEN ISLAND LAKE

An excellent sampling program was carried out on Thirteen Island Lake with 17 samples collected between the beginning of June and the end of September. Chlorophyll concentrations were noticeably higher and Secchi disc visibility depth lower during the month of August than at other times during the year.

Higher chlorophyll concentrations during 1985 and 1986 compared to 1984 and previous years are a result of a change in the analytical procedure for chlorophyll introduced by the laboratory in 1985. The change in the procedure has increased the recovery and detection of chlorophyll from lake water samples.

Chlorophyll concentrations were higher during 1986 than 1985. This may have been due to the unusually wet weather experienced during the summer. More phosphorus in rainfall and runoff may have produced more algae in lakes.

The Secchi disc visibility depth and chlorophyll record indicate the lake has very good water quality.

LAKE : THIRTEEN ISLAND LAKE ID NUMBER : 17-0035-015-01
TWP : BEDFORD, HINCHINBROOKE, LOUGHBOROUGH, PORTLAND
COUNTY : FRONTENAC

WATERSHED AREA	: 40.00	sq.km	SHORELINE	: 13.80	km.
SURFACE AREA	: 132.0	ha.	COTTAGES	: 60	
MAX DEPTH	: 25.90	m.	RESORTS	: 2 (4)	
VOLUME	: 6.63	mill cu. m.	% CROWN LAND	: 0	

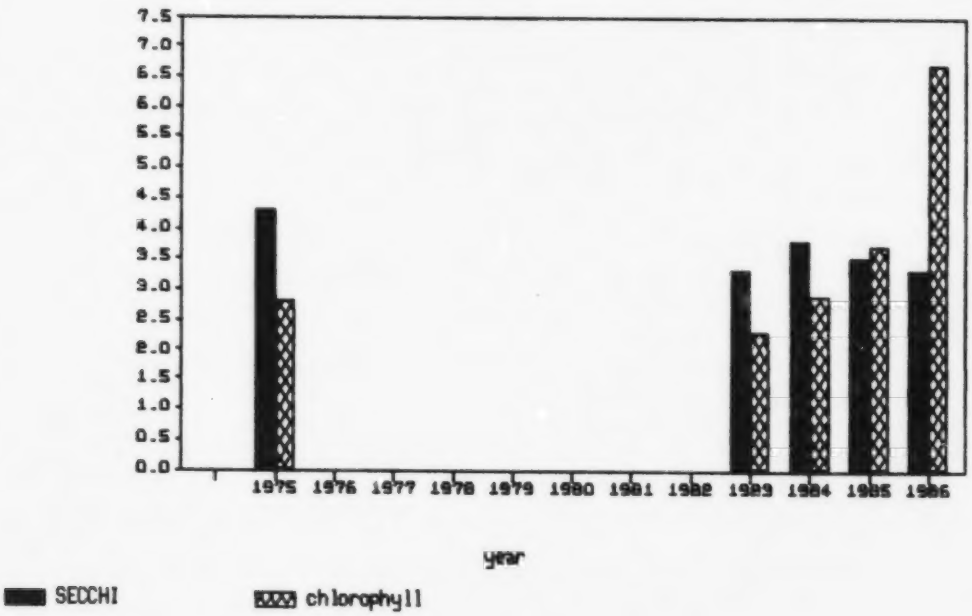
SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/01/86	3.1	3.8
06/08/86	3.4	5.2
06/15/86	3.4	4.6
06/22/86	3.1	4.0
06/29/86		4.5
07/06/86	3.6	3.4
07/13/86	3.7	6.0
07/20/86	3.3	11.3
07/27/86	3.7	6.7
08/04/86	3.1	13.6
08/10/86	3.1	14.1
08/17/86	3.1	7.9
08/31/86	3.4	6.1
09/07/86	3.1	6.6
09/14/86	3.4	7.0
09/21/86	3.5	5.8
09/28/86	3.7	4.8
MEAN	3.3	6.7
MAX	3.7	14.1
MIN	3.1	3.4
N	16	17
SD	0.24	3.24

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	4.3	2.8
1983	3.3	2.3
1984 ‡‡	3.8	2.9
1985	3.5	3.7
1986	3.3	6.7
MEAN	3.6	3.6
MAX	4.3	6.7
MIN	3.3	2.3
N	5	5
SD	0.42	1.76

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.

LAKE : THIRTEEN ISLAND LAKE ID NUMBER : 17-0035-015-01
TWP : BEDFORD, HINCHINBROOKE, LOUGHBOROUGH, PORTLAND
COUNTY : FRONTENAC

WATERSHED AREA	: 40.00	sq.km	SHORELINE	: 13.80	km.
SURFACE AREA	: 132.0	ha.	COTTAGES	: 60	
MAX DEPTH	: 25.90	m.	RESORTS	: 2 (4)	
VOLUME	: 6.63	mill cu. m.	% CROWN LAND	: 0	



TROY LAKE

An excellent program was carried out with sampling from April 12 to October 12. Chlorophyll concentrations generally increased between April and the middle of August and then gradually declined through to October. Water clarity declined from in excess of 3 metres of Secchi disc depth visibility at the start of the season to 1.1 metres of visibility by August. Water clarity improved after August as chlorophyll concentrations declined. This pattern of events is more or less typical of Troy Lake based on results for most previous years that Troy Lake has been included in the Self Help Program.

Chlorophyll concentrations of the magnitude experienced during 1986 have not been previously encountered in Troy Lake. Increased recovery and detection of chlorophyll from lake water samples by a change in the methodology for chlorophyll analysis introduced by the laboratory in 1985 and the unusually wet weather during the summer may be responsible. Increased amounts of phosphorus entering lakes in rainfall and runoff may have resulted in the production of more algae than normal.

The Secchi disc visibility depth and chlorophyll concentration record for 1986 indicate that water quality conditions in South Lake were not as favorable for water oriented recreational activities as in previous years of record. A similar situation was observed in South Lake.

Mr. Juerg Arnold was presented an awards plaque for ten years of participation in the Self Help Program on Troy Lake. The presentation was made by the Ministry of the Environment at an awards ceremony held in Kingston on September 19, 1986.

LAKE : TROY LAKE
TWP : SOUTH CROSBY
COUNTY : LEEDS

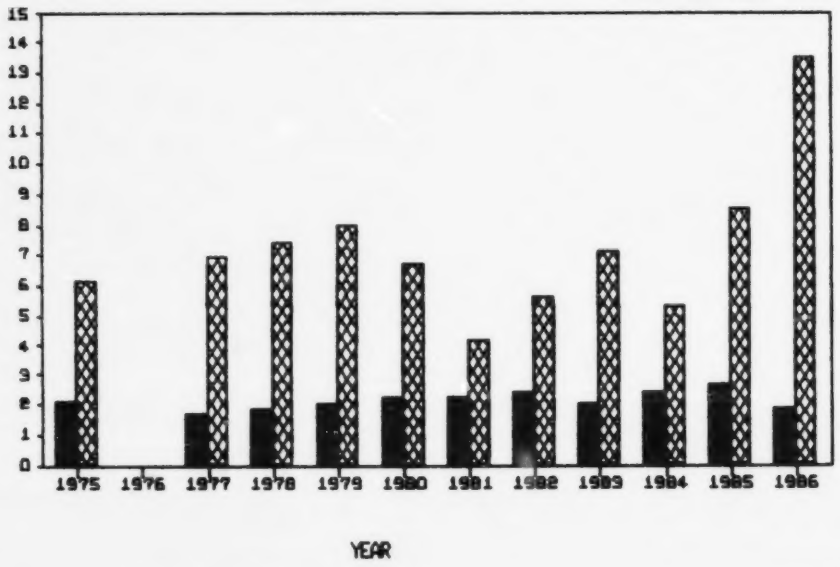
ID NUMBER : 12-0004-019-01

WATERSHED AREA	: 8.17	sq.km	SHORELINE	: 8.50	km.
SURFACE AREA	: 119.0	ha.	COTTAGES	: 16 (1974)	
MAX DEPTH	: 5.20	m.	RESORTS	: 0	
VOLUME	: 2.74	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
04/20/86	2.7	4.2
04/27/86	3.1	7.9
05/11/86	3.0	5.4
05/25/86	3.1	3.5
06/08/86	2.4	4.7
06/15/86	2.1	8.3
07/01/86	1.5	19.8
07/06/86	1.2	25.8
07/28/86	1.1	22.9
08/10/86	1.1	31.2
08/17/86	1.2	22.3
09/01/86	1.4	12.3
09/21/86	1.7	12.0
10/12/86	1.8	8.9
MEAN	1.9	13.5
MAX	3.1	31.2
MIN	1.1	3.5
N	14	14
SD	0.77	9.13

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1975 ‡‡	2.1	6.2
1977	1.7	6.9
1978	1.9	7.4
1979	2.0	8.0
1980	2.3	6.7
1981	2.3	4.2
1982	2.4	5.6
1983	2.0	7.1
1984	2.4	5.3
1985	2.6	8.5
1986	1.9	13.5
MEAN	2.1	7.2
MAX	2.6	13.5
MIN	1.7	4.2
N	11	11
SD	0.27	2.42

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



TWIN SISTERS LAKE

A total of 15 samples from May 19 to November 3 provided excellent seasonal coverage of water quality conditions in the west basin of Twin Sisters Lake. Fewer samples were collected from the east basin but the number was sufficient to conclude that the water quality in the two basins is similar. Chlorophyll concentrations were slightly higher during July and August than during other months that sampling was carried out. Water clarity did not vary much at all during the duration of sampling.

Higher chlorophyll concentrations during 1985 and 1986 compared to 1984 and previous years are a result of a change in the analytical procedure for chlorophyll introduced by the laboratory in 1985. The change in the procedure has increased the recovery and detection of chlorophyll from lake water samples.

The Secchi disc visibility depth and chlorophyll concentration record indicate Twin Sisters Lake has good water quality with above average water clarity.

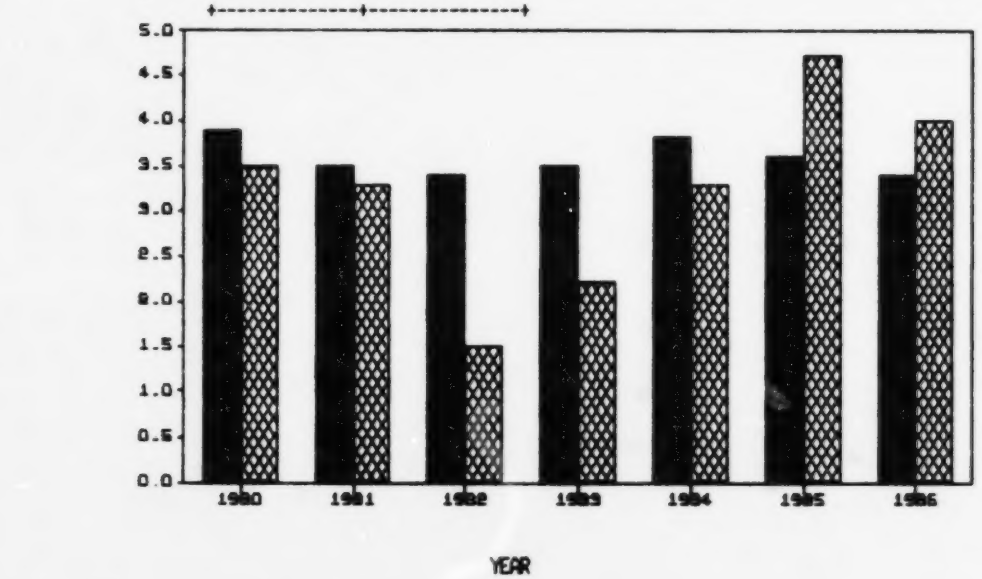
LAKE : TWIN SISTER LAKES : EAST BASIN ID NUMBER : 17-0021-012-01
TWP : MARMORA
COUNTY : HASTINGS

WATERSHED AREA	: 6.90	sq.km	SHORELINE	: 4.40	km.
SURFACE AREA	: 51.0	ha.	COTTAGES	: 20	
MAX DEPTH	: 8.54	m.	RESORTS	: 0	
VOLUME	: 1.74	mill cu. m.	% CROWN LAND	: 0	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
05/19/86	3.5	3.2
05/25/86	3.4	3.4
06/01/86	3.4	3.9
06/08/86	3.5	4.4
06/15/86	3.5	3.3
06/22/86	3.4	3.3
06/30/86	3.3	4.9
07/06/86	3.5	6.1
08/10/86	3.5	5.3
08/14/86	3.7	3.2
08/20/86	3.7	4.1
08/28/86	3.5	4.7
09/17/86	3.1	2.4
09/24/86	3.4	5.0
11/03/86	2.9	3.6
MEAN	3.4	4.0
MAX	3.7	6.1
MIN	2.9	2.4
N	15	15
SD	0.20	1.00

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1980 ‡‡	3.9	3.5
1981 ‡	3.5	3.3
1982	3.4	1.5
1983	3.5	2.2
1984	3.8	3.3
1985	3.6	4.7
1986	3.4	4.0
MEAN	3.5	3.2
MAX	3.9	4.7
MIN	3.4	1.5
N	7	7
SD	0.20	1.07

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



LAKE : TWIN SISTER LAKES : WEST BASIN ID NUMBER : 17-0021-013-01
TWP : MARMORA
COUNTY : HASTINGS

WATERSHED AREA	: 8.70	sq.km	SHORELINE	: 3.20	km.
SURFACE AREA	: 35.0	ha.	COTTAGES	: 21	
MAX DEPTH	: 13.40	m.	RESORTS	: 0	
VOLUME	: 1.96	mill cu. m.	% CROWN LAND	: 0	

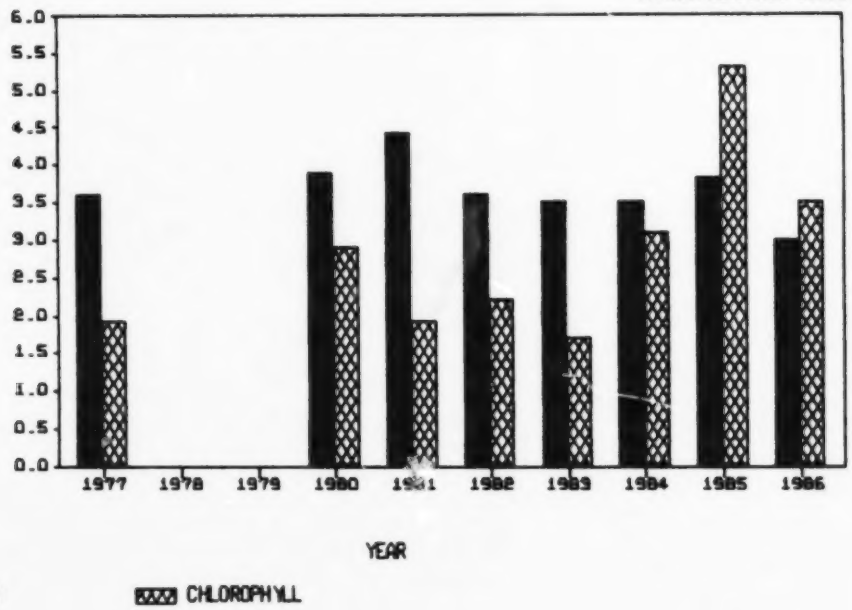
WEST BASIN

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/08/86	3.1	2.3
06/15/86	2.9	1.9
07/01/86	3.0	5.1
07/06/86	3.0	5.5
09/01/86	3.2	2.7
10/13/86	3.1	4.7
MEAN	3.0	3.7
MAX	3.2	5.5
MIN	2.9	1.9
N	6	6
SD	0.10	1.57

WEST BASIN

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1977	3.6	1.9
1980 ‡‡	3.9	2.9
1981	4.4	1.9
1982	3.6	2.2
1983	3.5	1.7
1984	3.5	3.1
1985	3.8	5.3
1986	3.0	3.7
MEAN	3.6	2.8
MAX	4.4	5.3
MIN	3.0	1.7
N	8	8
SD	0.40	1.22

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.



WEST LAKE

Six samples were collected from June 7 to September 1. Chlorophyll concentrations gradually increased as the season progressed, but water clarity was fairly uniform during the entire sampling period. Chlorophyll concentrations are lower and water clarity better than during the comparable period in 1985.

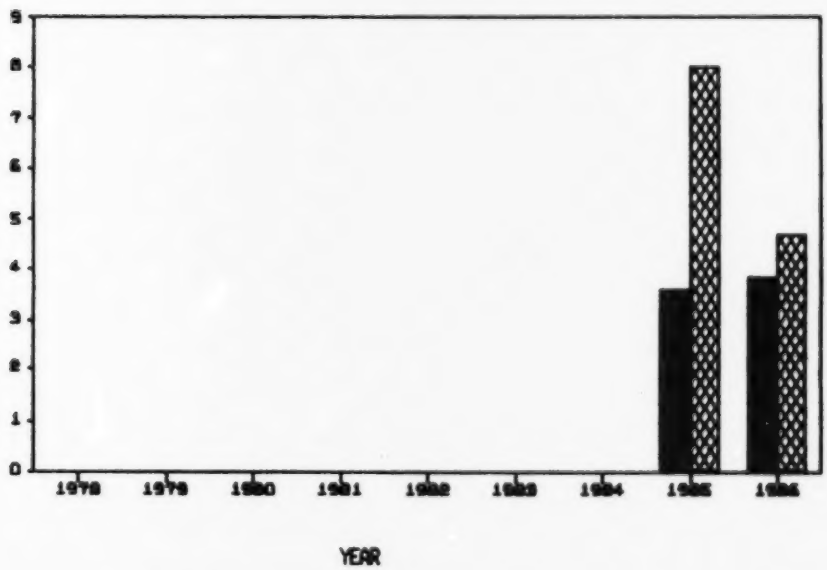
LAKE : WEST LAKE
TWP : SHEFFIELD
COUNTY : LENNOX & ADDINGTON

ID NUMBER : 17-0035-016-01

WATERSHED AREA	:	sq.km	SHORELINE	:	km.
SURFACE AREA	:	ha.	COTTAGES	:	
MAX DEPTH	:	m.	RESORTS	:	
VOLUME	:	mill cu. m.	% CROWN LAND	:	

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
06/07/86	3.7	3.3
06/21/86	4.0	3.5
06/28/86	3.8	3.8
07/26/86	3.7	4.9
08/25/86	3.7	7.8
09/01/86	4.0	5.0
MEAN	3.8	4.7
MAX	4.0	7.8
MIN	3.7	3.3
N	6	6
SD	0.15	1.67

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1985	3.6	8.0
1986	3.8	4.7
MEAN	3.7	6.3
MAX	3.8	8.0
MIN	3.6	4.7
N	2	2
SD	0.14	2.33



WHITE LAKE

An excellent sampling program was carried out on White Lake with 18 samples collected from each of two locations from April 30 to October 20 providing comprehensive coverage of water quality conditions of White Lake. The results indicate there was no difference in water quality between the two locations. Chlorophyll concentrations were generally lower and water clarity better during May and October than throughout the rest of the sampling period.

Higher chlorophyll concentrations during 1985 and 1986 compared to 1984 and previous years are a result of a change in the analytical procedure for chlorophyll introduced by the laboratory in 1985. The change in the procedure has increased the recovery and detection of chlorophyll from lake water samples.

Water clarity was better and chlorophyll concentrations lower during 1986 than was the case during 1985.

The Secchi disc visibility depth and chlorophyll concentration record indicate White Lake has good water quality.

LAKE : WHITE LAKE
TWP : DARLING, BAGOT, MCNAB, PAKENHAM
COUNTY : LANARK & RENFREW

ID NUMBER : 18-3490-039-01

WATERSHED AREA	: 211.00	sq.km	SHORELINE	: 97.80 km.	
SURFACE AREA	: 2269.0	ha.	COTTAGES	: 449 + 5 HOUSES	
MAX DEPTH	: 9.20	m.	RESORTS	: 10 (508)	
VOLUME	: 74.74	mill cu. m.	% CROWN LAND	: 50	

STATION 1

SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
04/30/86	3.4	2.1
05/15/86	3.4	1.6
05/26/86	3.4	2.7
06/04/86	2.9	6.0
06/11/86	2.7	5.9
06/19/86	2.6	5.0
07/02/86	3.2	8.6
07/11/86	2.4	7.2
07/15/86	2.6	2.8
07/23/86	3.1	2.0
08/07/86	2.3	8.6
08/14/86	2.3	5.9
08/22/86	2.1	6.4
09/05/86	2.7	5.9
09/17/86	2.9	5.0
09/24/86	2.9	
10/01/86	2.9	4.8
10/20/86	3.4	3.0
MEAN	2.8	4.9
MAX	3.4	8.6
MIN	2.1	1.6
N	18	17
SD	0.42	2.22

STATION 2

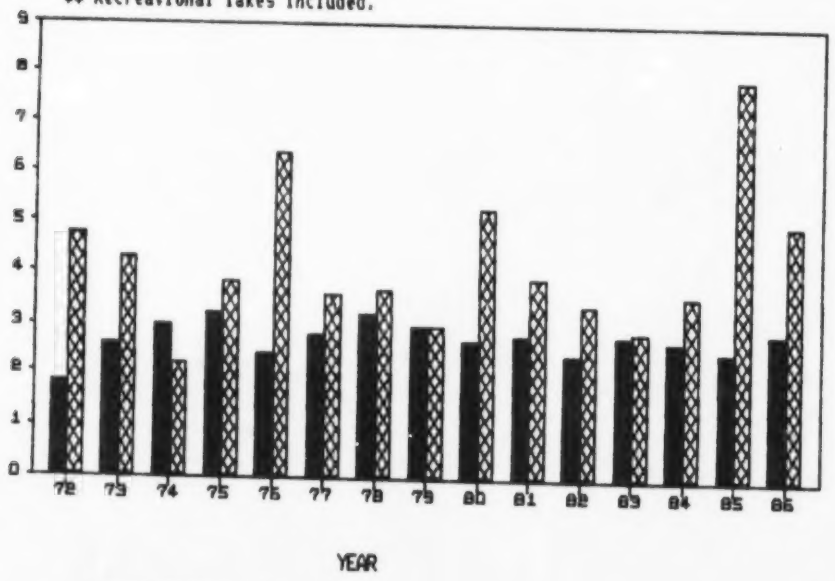
SAMPLE DATE (MM/DD/YY)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
04/30/86	3.8	2.8
05/15/86	3.7	
05/26/86	3.8	2.1
06/04/86	3.2	4.9
06/11/86	3.2	5.0
06/19/86	2.6	
07/02/86	3.5	
07/11/86	3.5	3.4
07/15/86	2.6	2.1
07/23/86	3.2	
08/07/86	2.3	9.7
08/14/86	2.3	6.2
08/22/86	2.1	6.5
09/05/86	2.3	5.6
09/17/86	2.1	7.7
09/24/86	2.7	5.3
10/01/86	2.9	5.4
10/20/86	3.7	3.6
MEAN	2.9	5.0
MAX	3.8	9.7
MIN	2.1	2.1
N	18	14
SD	0.61	2.15

LAKE : WHITE LAKE
TWP : DARLING, BAGOT, MCNAB, PAKENHAM
COUNTY : LANARK & RENFREW

ID NUMBER : 18-3490-039-01

WATERSHED AREA	: 211.00	sq.km	SHORELINE	: 97.80 km.
SURFACE AREA	: 2269.0	ha.	COTTAGES	: 449 + 5 HOUSES
MAX DEPTH	: 9.20	m.	RESORTS	: 10 (508)
VOLUME	: 74.74	mill cu. m.	% CROWN LAND	: 50

STATIONS 1 AND 2 COMBINED

SAMPLE DATE (YEAR)	SECCHI DEPTH (METERS)	CHLOROPHYLL A (UG/L)
1972 ‡	1.8	4.8
1973	2.6	4.3
1974	3.0	2.2
1975 ‡‡	3.2	3.8
1976	2.4	6.4
1977	2.8	3.6
1978	3.2	3.7
1979	3.0	3.0
1980	2.7	5.3
1981	2.8	3.9
1982	2.4	3.4
1983	2.8	2.9
1984	2.7	3.6
1985	2.5	7.9
1986	2.9	5.0
MEAN	2.7	4.2
MAX	3.2	7.9
MIN	1.8	2.2
N	15	15
SD	0.36	1.46

NOTE : ‡ Based on less then 6 readings.
‡‡ Recreational lakes included.